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Vanessa C. Perez
Texas A&M School of Law

LIQUID BUSINESS

VANESSA CASADO PEREZ*

Water is scarcer due to climate change and in higher demand due to population growth than ever before. As if these stressors were not concerning enough, corporate investors are participating in water markets in ways that sidestep U.S. water law doctrine's aims of preventing speculation and assuring that the holders of water rights internalize any externalities associated with changes in their rights. The operation of these new players in the shadow of traditional water law is producing elements of inefficiency and unfairness in the allocation of water rights. Resisting the polar calls for unfettered water markets, or, contrarily, the complete de-commodification of water in the face of these challenges, this Article identifies a portfolio of measures that can help get regulated water markets back on a prudent, sustainable track in our contemporary world. The portfolio includes institutional changes and measures aimed at redefining water rights. Regarding the administration and management of water rights, the Article proposes: mechanisms to address the effects on the communities where water originates, structures for joint management of surface and ground water; and tools to ensure fulfillment of all persons' basic water needs. The changes in water rights: exclude return flows; establish character criteria for water rights holders; and define quantitative limits on the amount of water one person or entity can hold at a given time.

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* Associate Professor, Texas A&M School of Law. Research Associate Professor, Texas A&M Department of Agricultural Economics. Affiliate researcher at the Bill Lane Center for the American West at Stanford University. JSD (NYU), LLM (University of Chicago), vcasado@law.tamu.edu. The author would like to thank her colleagues who participated in the 2019 Texas A&M Law Faculty retreat, Houston Law Center Environment, Energy, and Natural Resources Center (EENR) Work in Progress Roundtable, the Ostrom Workshop at the University of Indiana at Bloomington, Texas A&M Enviroschmooze, and RMMLF Natural Resources Teachers workshop. I would also like to thank for their comments Reed Benson, Sarah Krakoff, and Katrina Wyman. I am also grateful for my fantastic research assistants Steffani Fausone and Elizabeth Weis. Finally, I want to thank the editors of this volume of *The Florida State University Law Review* for their hard work. Errors are mine alone.

I. INTRODUCTION[1]

The aphorism "water is the new oil"[2] is now truer than it has ever been. While many use the phrase to suggest that water is as scarce and valuable as oil once was, it is also true in another sense:

1. This introduction is inspired by an essay published by the author as part of Inara Scott et al., *Environmental Law. Disrupted.*, 49 ENVTL. L. REP. 10038 (2019). Also available as a blog post: Vanessa Casado Pérez, *Liquid Business*, ENVTL. L. PROF BLOG (Nov. 13, 2018), https://lawprofessors.typepad.com/environmental_law/2018/11/liquid-business.html.

2. *See generally* Julian Brookes, *Why Water Is the New Oil*, ROLLING STONE (July 7, 2011, 11:20 AM), https://www.rollingstone.com/politics/politics-news/why-water-is-the-new-oil-198747/ [https://perma.cc/FY2P-P9VY]; Andrew Ward, *Water Set to Become More Valuable than Oil,* FIN. TIMES (Mar. 19, 2017), https://www.ft.com/content/fa9f125c-0b0d-11e7-ac5a-903b21361b43 [https://perma.cc/RX27-3VJ9]; Steven Solomon, *Water Is the New Oil*, HUFFINGTON POST (Mar. 18, 2010, 5:12 AM), https://www.huffingtonpost.com/steven-solomon/water-is-the-new-oil_b_380803.html [https://perma.cc/EXN6-4T2C]; David Wethe, *Water Is Almost as Precious as Oil in the Permian Basin*, BLOOMBERG (Jan. 24, 2019, 6:00 AM), https://www.bloomberg.com/news/articles/2019-01-24/ranch-fetches-33-million-and-proves-water-is-red-hot-commodity [https://perma.cc/9PAF-UT4W].

speculation in water markets now rivals speculation in oil markets. Oddly, however, water scarcity has not translated into a higher price for water, as it has done in oil. But this anomaly may be on the verge of changing as international investors start to enter the business of climate change.[3] From oil tycoons like T. Boone Pickens[4] or the Bass brothers[5] to international hedge funds,[6] investment in all things water is on the rise. And while many deny climate change, the market does not. Since climate change is widely expected to induce scarcity in water supplies, business investments in the water market broadly understood are increasing rapidly.[7] This investment disproves the long-held theory that water was different than, say, energy, because the regulatory framework stifled innovation and investment.[8] While regulations may have discouraged those in the past, when water has become truly valuable, money like water has found a hole.

The alarm has gone off. Those who believe markets should not commodify water are appalled by the role that investment moguls play.[9] These new investments in water escape the rules that constraint speculation[10] and protect third parties and the environment from externalities in traditional water markets, that is, in the exchange of water rights. Water may no longer be speculation resistant. [11]

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3. *See generally* MCKENZIE FUNK, WINDFALL: THE BOOMING BUSINESS OF GLOBAL WARMING (2014). Nonetheless, the very term "water market" is ambiguous. Those who criticize water markets often conflate trading of water rights with privatization of water utilities. That is a mistake. It is both too broad, in that it encompasses more than trading the water itself, and too narrow, in that water investors look beyond water rights and water utilities to things like water conservation and wastewater. VANESSA CASADO PÉREZ, THE ROLE OF GOVERNMENT IN WATER MARKETS 15-16 (2017).

4. Sandra Zellmer, *The Anti-Speculation Doctrine and Its Implications for Collaborative Water Management*, 8 NEV. L. J. 994, 999 (2008).

5. Peter Passell, *A Gush of Profits from Water Sale?*, N.Y. TIMES (Apr. 23, 1998), https://www.nytimes.com/1998/04/23/business/a-gush-of-profits-from-water-sale.html [https://perma.cc/W5K4-3DSV].

6. Abrahm Lustgarten & ProPublica, *A Free-Market Plan to Save the American West from Drought*, ATLANTIC MONTHLY, Mar. 2016, https://www.theatlantic.com/magazine/archive/2016/03/a-plan-to-save-the-american-west-from-drought/426846/ [https://perma.cc/BM3M-9RBF].

7. Zellmer, *supra* note 4, at 995.

8. NEWSHA K. AJAMI ET AL., STANFORD WOODS INSTITUTE FOR THE ENV'T, THE PATH TO WATER INNOVATION 11–14 (2014), http://www.hamiltonproject.org/assets/legacy/files/downloads_and_links/path_to_water_innovation_thompson_paper_final.pdf [https://perma.cc/T5C3-LAU5].

9. MAUDE BARLOW & TONY CLARKE, BLUE GOLD: THE FIGHT TO STOP THE CORPORATE THEFT OF THE WORLD'S WATER 79 (2005).

10. Zellmer, *supra* note 4, at 997. For the claim that water is more speculation-resistant than oil, *see* Timothy Egan, *Near Vast Bodies of Water, Land Lies Parched,* N.Y. TIMES, (Aug. 12, 2001), https://www.nytimes.com/2001/08/12/us/near-vast-bodies-of-water-land-lies-parched.html [https://perma.cc/663Y-PXWY].

11. *Id.*

Water rights can be traded in the Western United States and in other jurisdictions such as Australia or Chile.[12] Trade includes leases and sales of water rights that give the buyer the right to use water if it is available.[13] Transactions are often subject to the approval of an administrative agency and are not approved if they injure third parties or the environment.[14] Water rights are defined across several variables, including the point of diversion and the type of use.[15] A transaction will normally imply a change in either or both of those variables. Before a transaction takes place, a water agency ensures that those changes will not affect other users or the ecosystem.[16] A common transaction might be one between an agricultural right holder and an urban consumer, because the latter often has a higher willingness to pay and a less elastic demand curve.[17] In the Western United States, these types of transactions have brought flexibility to water allocation systems, where the majority of water rights were allocated when agriculture was the main economic activity, and large cities and suburban areas with luscious lawns had not developed.[18] Those transactions should make the farmer realize the opportunity cost of using water. But as a result of the review procedure, these exchanges imply high transaction costs.[19] Those transaction costs are even higher when water, inherently a local good, needs to be transported. Thus, speculators may be dissuaded.[20]

Another barrier against speculation, and more relevant for the purposes of speculation, is the forfeiture provision included in all prior appropriation states and many other jurisdictions.[21] Forfeiture of unused rights is based on the idea that we allow private parties rights over a common resource—water—only for productive purposes, and sitting on your rights to increase your profit is not a productive

12. *Id*; *see generally* Tim Goesch et al., *Snapshot of Australian Water Markets*, ABARES INSIGHTS, no. 2, 2019, at 1, https://www.agriculture.gov.au/abares/publications/insights/snapshot-of-australian-water-markets [https://perma.cc/Q4JM-MZTX].

13. Ellen Hanak et al., *California's Water Market*, PPIC WATER POL'Y CTR. (May 2019), https://www.ppic.org/publication/californias-water-market/ [https://perma.cc/AM35-L52R].

14. *See* Zellmer, *supra* note 4, at 1025.

15. *See id.* at 1012.

16. *Id.*

17. *Id.* at 1019, 1023–24.

18. *Id.* at 1007–09, 1019–22.

19. *Id.* at 1019–22; *see also* K. William Easter et al., *Water Markets: Transaction Costs and Institutional Options*, *in* MARKETS FOR WATER: POTENTIAL AND PERFORMANCE 1–18 (K. William Easter et al., eds., 1998).

20. *See* Zellmer, *supra* note 4, at 1004.

21. Janet C. Neuman & Keith Hirokawa, *How Good is an Old Water Right? The Application of Statutory Forfeiture Provisions to Pre-Code Water Rights*, 4 U. DENV. WATER L. REV. 1, 5 (2000).

purpose.[22] These forfeiture provisions mandate that holders of water rights use the water.[23] If they do not use it for a certain period, usually around five years, they may lose the water right.[24] So unlike with real estate or stocks and bonds, where owners can wait for the market to peak and then sell their assets, in water markets, owners cannot engage in this kind of wait-and-see. That said, if water becomes valuable enough, investors may find a way around these rules. One company, Water Asset Management, is taking that route by considering land as an accessory.[25] It focuses on water itself, but to get to it, it buys land, and it tries to make use of the land to break even.[26]

While investors do buy water rights, the constraints may explain why, in our current water scarcity scenario we have mostly seen investments toward related industries, such as water conservation technology, water utilities, or reuse. While water rights changes and exchanges are subject to a review in order to prevent negative externalities on third parties and discourage speculation, the investments in other water assets or water related industries is not subject to such control. Thus, the current landscape in water markets can entail a series of negative effects for which the regulatory framework does not have answers to.[27] This Article identifies those problems and offers potential regulatory avenues to address them.

The current investment in all things water, from water rights to water utilities, gives raise to among others the following concerns. First, some companies who have contributed to climate change are now benefiting from their own misconduct because these companies are investing in water, an asset made more valuable as result of climate change.[28] Second, corporatization moves the locus of decision further away from the area where water originates from and the community from the area may suffer negative consequences. While economists despise community externalities, this type of effects has been addressed in traditional water markets. [29] In addition, there may certain

22. ROBERT W. ADLER ET AL., MODERN WATER LAW. PRIVATE PROPERTY, PUBLIC RIGHTS, AND ENVIRONMENTAL PROTECTION, 148–49 (2013).

23. Zellmer, *supra* note 4, at 1005.

24. LEON F. SZEPTYCKI ET AL., ENVIRONMENTAL WATER RIGHTS TRANSFERS: A REVIEW OF STATE LAWS 14 (2015). Some states, like New Mexico, have a lower time limit. New Mexico has a four year forfeiture provision. *See* ADLER ET AL., *supra* note 22, at 150.

25. Lustgarten & ProPublica, *supra* note 6.

26. *Id.*

27. TERRY L. ANDERSON & PAMELA SNYDER, WATER MARKETS: PRIMING THE INVISIBLE PUMP 1–16 (1997).

28. *See infra* section IV.A.

29. *See generally* Lawrence J. MacDonnell & Charles W. Howe, *Area-of-Origin Protection in Transbasin Water Diversions: An Evaluation of Alternative Approaches*, 57 U. COLO. L. REV. 527 (1985); *see also* A. Dan Tarlock, *Reconnecting Property Rights to Watersheds*, 25 WM. & MARY ENVTL. L. & POL'Y REV. 69 (2000).

intangible values, mainly the communitarian values water embeds, in a single monetary price.[30] Third, water prices are expected to increase.[31] There is some merit in valuing water as a scarce resource so that we do not misuse it. The more expensive it is, the shorter our showers would be and the more thoughtful the choice of crops and irrigation techniques would be. Today we do not put a price on scarcity; water bills reflect only treatment and transportation costs.[32] Paying water's true value will make everyone more conscious of the choices we make. But, at the same time, the low-income population may be priced out. Fourth, a few actors, mainly the large international water companies, may dominate these new and expanded water markets. Fifth, new investments in water are exploiting regulatory gaps in the current system. For example, while scientifically nobody denies that surface and groundwater are connected, some of our water laws do.[33] Accordingly, investors may turn to groundwater to escape regulatory control[34] and, thus, cause effects on existing water users and the ecosystem. Similarly, investment in water reuse may have systemic effects because it reduces return flows and other users have relied on

30. *See* Vanessa Casado Pérez, *Missing Water Markets: A Cautionary Tale of Governmental Failur*e, 23 N.Y.U. ENVTL. L. J. 157, 166 (2015). Other illustrations of the particular attachment of communities to water can be found in Barton H. Thompson Jr., *Institutional Perspectives on Water Policy and Markets*, 81 CALIF. L. REV. 671, 734 (1993) (a water board elected by the population that votes in any other local election, not just by farmers, are usually more reluctant to approve water transactions). *See also*, J. Owen Saunders, *Trade Agreements and Environmental Sovereignty: Case Studies from Canada*, 35 SANTA CLARA L. REV. 1171, 1180–81 (1995) (reporting that Canadians have a different reaction to the sale of water than they have to the sale of other natural resources).

31. David Zetland, *Zetland on Segerfeldt*, '*Water for Sale: How Business and the Market Can Resolve the World's Water Crisis*', H-WATER (June 21, 2009) (book review), https://networks.h-net.org/node/15526/reviews/15638/zetland-segerfeldt-water-sale-how-business-and-market-can-resolve [https://perma.cc/B4VD-K2D6].

32. U.S. ENVTL. PROTECTION AGENCY, *Understanding Your Water Bill*, https://www.epa.gov/watersense/understanding-your-water-bill [https://perma.cc/5XLS-69TJ].

33. For a description about the hydrology of groundwater and the interconnection between surface water and groundwater see ADLER ET AL., *supra* note 22, at 173–78. For the conflicts between surface and groundwater see *id.* at 206–25. For an example of the overexploitation of both connected resources see Candice Wang, *Appetite for California Almonds Still Growing, but Farmers Feel Squeeze from New Water Rules,* SACRAMENTO BEE (Aug. 2, 2019, 5:30 AM), https://www.sacbee.com/news/local/environment/article231906623.html (almond growers in California facing curtailments of water rights due to instream flow protections may turn to groundwater affecting the same stream).

34. Tate Dwinnell, *T. Boone Pickens Invests in Water—Should You?*, SEEKING ALPHA (Jan. 17, 2007, 3:55 PM), https://seekingalpha.com/article/24410-t-boone-pickens-invests-in-water-should-you [https://perma.cc/7K76-ZFYY].

these flows to fulfill their rights.[35] Finally, these new investments are able to sidestep the anti-speculation rules in water rights by paying lip service to them.

Scholars writing on water rights exchanges can be classified in three groups depending on their stance toward markets as a water management tool. On the one side, free-market environmentalists defend markets for the allocation of any natural resource as a better method than administrative allocation.[36] On the other, there are those who believe that water should never be subject to market rules.[37] In between, there is a third group that looks at markets as one of the tools in the water management toolkit and focuses on how to structure them.[38] The literature on water markets broadly understood, which encompasses far more than water rights exchanges, is not dominated by legal academics, but it presents a similar division. There are scholars at both extremes—pro-market[39] and against commodification[40]—but the middle group, which can be found in the legal scholarship on

35. Montana v. Wyoming, 563 U.S. 368, 377–78 (2011); Lawrence J. MacDonnell, *Montana v. Wyoming: Sprinklers, Irrigation Water Use Efficiency, and the Doctrine of Recapture,* 5 GOLDEN GATE U. ENVTL. L. J. 265 (2012). For an analysis of the systemic effects, *see* Vanessa Casado Pérez, *Inefficient Efficiency: Crying Over Spilled Water*, 46 ENVTL. L. REP. 11046, 11058 (2016).

36. *See* James L. Huffman, *Institutional Constraints on Transboundary Marketing*, *in* WATER MARKETING: THE NEXT GENERATION 32 (Terry L. Anderson & Peter J. Hill eds., 1997); TERRY L. ANDERSON & DONALD R. LEAL, FREE MARKET ENVIRONMENTALISM (rev. ed. 2001); TERRY L. ANDERSON & PAMELA SNYDER, *supra* note 27; *see also* James L. Huffman, *Water Marketing in Western Prior Appropriation States: A Model for the East*, 21 GA. ST. U. L. REV. 429 (2004) [hereinafter Huffman, *Water Marketing*]; James L. Huffman, *Markets, Regulation, and Environmental Protection*, 55 MONT. L. REV. 425 (1994); Andrew P. Morriss, *Real People, Real Resources, and Real Choices: The Case for Market Valuation of Water*, 38 TEX. TECH L. REV. 973, 983 (2006); RODNEY T. SMITH, TRADING WATER: AN ECONOMIC AND LEGAL FRAMEWORK FOR WATER MARKETING (1988); Mateen Thobani, *Tradable Property Rights to Water: How to Improve Water Use and Resolve Water Conflicts*, 34 PUB. POL'Y FOR PRIV. SECTOR, Feb. 1995, at 1, 1, https://sswm.info/sites/default/files/reference_attachments/THOBANI%201995%20Tradable%20Property%20Rights%20to%20Water.pdf?iframeView=true [https://perma.cc/23WR-GU45].

37. *See, e.g.*, Norman W. Spaulding III, *Commodification and Its Discontents: Environmentalism and the Promise of Market Incentives*, 16 STAN. ENVTL. L. J. 293, 295–96, 324–25 (1997); Michael C. Blumm, *The Fallacies of Free Market Environmentalism*, 15 HARV. J.L. & PUB. POL'Y 371, 375 (1992); Joseph W. Dellapenna, *The Importance of Getting Names Right: The Myth of Markets for Water*, 25 WM. & MARY ENVTL. L. & POL'Y REV. 317, 320 (2000).

38. *See* Joseph L. Sax, *Understanding Transfers: Community Rights and the Privatization of Water*, 14 HASTINGS W.-NW. J. ENVTL L. & POL'Y 33, 35–38 (2008); Barton H. Thompson, Jr., *Institutional Perspectives on Water Policy and Markets*, 81 CALIF. L. REV. 671, 673–79 (1993); Robert Glennon, *Water Scarcity, Marketing, and Privatization*, 83 TEX. L. REV. 1873, 1884–88 (2005) (advocating for a community perspective in water markets in order to channel the potential externalities); *see also* Robert Glennon, *The Quest for More Water—Why Markets Are Inevitable*, 24 PERC REP., no. 3, Sept. 2006, at 7, 9, https://www.perc.org/wp-content/uploads/2018/01/sept06.pdf [https://perma.cc/XN86-8QXP].

39. *See generally* FREDRIK SEGERFELDT, WATER FOR SALE: HOW BUSINESS AND THE MARKET CAN RESOLVE THE WORLD'S WATER CRISIS (2005).

40. *See generally* BARLOW & CLARKE, *supra* note 9.

exchanges of water rights, is somewhat missing in the discussion about water markets broadly understood. This Article aims at filling that middle gap from a legal perspective by offering water regulatory tools. In other words, water markets today are way more than the exchange of water rights between farmers, and water regulation needs to adapt to the challenges this new form of water markets present without compromising the efficiency and fairness principles behind Western water law.

Accordingly, this Article does not try to answer the complex and multi-faceted question of whether water should be a commodity like oil. To an extent, some of the forces pushing water towards commodification are unstoppable. This paper answers the question of whether there is something that water law could do to mitigate the negative externalities that may arise from this new money flowing into water markets and ensure a certain level of fairness, where fairness is a concern, in the allocation of water. No matter where someone stands on the debate on water as a public commodity, everyone would agree that negative externalities should be internalized. But many, in addition, believe that given how essential for life water is, it has a special place in our society and should not be allocated like other commodities. This view of water as special is shown in the constitutional broad proclamations that water is of the public. Fairness in water allocation stems from this view, as well as the fact that water is essential to life. The fairness concern in natural resources is also often closely related to the protection of smaller users, such as family farms. It remains to be seen whether a far more distributed allocation has larger social benefits than an allocation between a few large-scale companies. In any event, agencies would be less powerful if they only regulated big companies.

This Article shows how states could use their water law to tackle some of the problems presented by water markets while recognizing that water exchanges are a positive tool in a broad water management toolkit to ensure flexibility in water allocation. Hence, given that plenty of forces are pushing water to be the new oil and the commodification of water may be unstoppable, states should tackle the potential negative effects of markets in their water regulations, both addressing efficiency and fairness concerns. First, a framework to consider and mitigate the effects on communities and to give these communities voice is necessary. Second, strategies like vouchers or tiered pricing in water bills could attenuate the affordability crisis in low-income communities if water prices go up. Third, states should adopt conjunctive management of surface and groundwater via a

permit system, [41] reform their current approach to return flows, and enhance their anti-speculation regulations by making it more difficult for water investors to sit on their water rights and prevent accumulation of water rights in few hands. Water law can take a page from other natural resources markets and avoid concentration by limiting the amount of water rights that can be accumulated in the same hands. In fisheries' individual transferable quota (ITQ) programs, there are limits on the shares of the total allowable catch that a single ITQ owner can acquire.[42]

An adage seems appropriate to close this introduction. Mark Twain purportedly said that, "Whisky is for drinking and water is for fighting."[43] Water scarcity will certainly cause fights, as there will not be enough water for all users. Companies see water as ripe for business and maximizing its value is essential. But the question that lingers is whether water law can put up a fight and reduce the risk that corporate interests may disrupt the water regulatory regime.[44] Water markets broadly understood must be regulated markets. Water already is and may continue to be a commodity, but the portfolio of measures presented in this piece should make it a public commodity, recognizing that water is special, essential, and irreplaceable.[45]

Section II explains the reasons why water has become an attractive commodity. Section III explores the different ways investment is pouring into water, from investing in related industries to investing in water as an asset. Section IV describes the perceived negative effects from the private investment in water, and Section V sketches potential measures that could mitigate those concerns.

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41. *See* Barton H. Thompson, Jr., *Beyond Connections: Pursuing Multidimensional Conjunctive Management*, 47 IDAHO L. REV. 273, 275 (2011). For an explanation of the move towards permits for surface water, see ADLER ET AL., *supra* note 22, at 231–72.

42. Katrina M. Wyman, *Second Generation Property Rights Issues*, NAT'L RESOURCES J. 215, 220, n.37 (2019).

43. Cary Blake, *Whiskey is for Drinking; Agriculture Water is for Fighting*, FARM PROGRESS (Mar. 25, 2013), https://farmprogress.com/blog/whiskey-drinking-agriculture-water-fighting [https://perma.cc/5GPV-3FYM].

44. For an identification of the risks of the corporatization of energy markets, see Gina S. Warren, *1-Click Energy: Managing Corporate Demand for Clean Power*, 78 MD. L. REV. 73, 101 (2018).

45. *See also* Barton H. Thompson, Jr., *Water as a Public Commodity*, 95 MARQ. L. REV. 17, 17–19 (2011).

II. WHY IS WATER SO ECONOMICALLY VALUABLE?

Water is essential. It is considered an "axis resource" because it underlies all others,[46] particularly all the drivers of growth.[47] Water is getting scarcer. Water scarcity is a function of supply and demand. While water demands are increasing because of population growth and changes in lifestyle,[48] water supply is dwindling.[49] An average American uses about 100 gallons a day at home;[50] however, his water footprint is much larger, up to 2,200 gallons a day[51] once we take into account water needed for products he consumes. For example, a pound of beef requires 1,799 gallons of water,[52] and the average American consumes 222.2 pounds of meat a year.[53] Furthermore, an average American drinks 167 plastic water bottles a year,[54] more than 39 gallons of bottled water, making the water bottle business a profitable one. In fact, nowadays, the average American drinks more bottled water than he drinks soda.[55] As

46. ALEX PRUD'HOMME, THE RIPPLE EFFECT: THE FATE OF FRESHWATER IN THE TWENTY-FIRST CENTURY 4 (2012).

47. Gl*obal Water Initiative*, WORLD ECON. F., https://www.weforum.org/projects/global-water-initiative [https://perma.cc/GR79-XEW5] (last visited Sept. 9, 2019).

48. M. Kummu et al., *The World's Road to Water Scarcity: Shortage and Stress in the 20th Century and Pathways Towards Sustainability,* SCI. REP. (Dec. 9, 2016), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5146931/pdf/srep38495.pdf [https://perma.cc/U4LU-RCNW].

49. Ashish Sharma et al., *If Precipitation Extremes Are Increasing, Why Aren't Floods?* 54 WATER RESOURCES RESEARCH RES. 8545 (2018); *Drought and Climate Change*, CENTER FOR CLIMATE AND ENERGY SOLUTIONS, https://www.c2es.org/content/drought-and-climate-change/https://www.c2es.org/content/drought-and-climate-change/ [https://perma.cc/S459-2E8B].

50. *Water Q&A: How Much Water Do I Use at Home Each Day?*, USGS: WATER SCI. SCH., https://water.usgs.gov/edu/qa-home-percapita.html [https://perma.cc/CQ5U-CP9L].

51. *Water Footprint Comparisons by Country*, WATER FOOTPRINT CALCULATOR (May 22, 2017), https://www.watercalculator.org/footprints/water-footprints-by-country/ [https://perma.cc/S6AR-C6UA].

52. Betty Hallock, *To Make a Burger, First You Need 660 Gallons of Water . . .* , L.A. TIMES (Jan. 27, 2014, 2:35 PM), https://www.latimes.com/food/dailydish/la-dd-gallons-of-water-to-make-a-burger-20140124-story.html [https://perma.cc/6V88-BM28].

53. Megan Durisin & Shruti Date Singh, *Americans' Meat Consumption Set to Hit a Record in 2018*, SEATTLE TIMES (Jan. 2, 2018, 8:52 PM), https://www.seattletimes.com/business/americans-meat-consumption-set-to-hit-a-record-in-2018/ [https://perma.cc/Y44H-RTGL].

54. Charles Fishman, *Message in a Bottle*, FAST CO. (July 1, 2007), https://www.fastcompany.com/59971/message-bottle [https://perma.cc/QF2T-PTYK].

55. *Americans Drank More Bottled Water than Soda in 2016*, CNBC (Mar. 10, 2017, 5:39 AM), https://www.cnbc.com/2017/03/10/americans-drank-more-bottled-water-than-soda-in-2016.html [https://perma.cc/54AW-Q4R5].

other countries' lifestyles become more similar to the United States,[56] the pressure on already scarce global water resources increases.

On the supply side, people often live in areas where water is not readily available. For a long time, we have relied on large infrastructure projects to ship water from humid areas to dry areas.[57] Supply is threatened both by the quality of that infrastructure and by climate change.[58] Water and wastewater infrastructure have received grades of D[59] and D+,[60] respectively, in the last scorecard of the American Society of Civil Engineers. This institution estimates that an investment of more than $1 trillion in water distribution infrastructure is necessary to meet the demand for the next 25 years.[61] Water infrastructure provision is one of the areas where the private sector is investing.[62] Furthermore, given the level of capital investment necessary, this is one of the justifications for the water sector to privatize traditional public functions.

Regarding the effects of climate change, the Intergovernmental Panel on Climate Change predicts that more people are going to live in water stressed regions of the world in 2050, and in those regions,

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56. Marcello Rossi, *Will China's Growing Appetite for Meat Undermine Its Efforts to Fight Climate Change?*, SMITHSONIAN (July 30, 2018), https://www.smithsonianmag.com/science-nature/will-chinas-growing-appetite-for-meat-undermind-its-efforts-to-fight-climate-change-180969789/ [https://perma.cc/R5JG-PNU8].

57. Susanna Eden & Rachel Murray, *Water, Business, and the Business of Water,* ARROYO, 2019 at 3 (2019); https://wrrc.arizona.edu/sites/wrrc.arizona.edu/files/attachment/Arroyo-2019.pdf [https://perma.cc/HL3H-JKMW]; Jeanine Jones, *History of Large-Scale Western Water Projects*, SW. HYDROLOGY, Sept./Oct. 2008, at 18, http://www.swhydro.arizona.edu/archive/V7_N5/feature1.pdf [https://perma.cc/Q87Q-79HC].

58. David Sedlak, *How Development of America's Water Infrastructure Has Lurched Through History*, PEW RESEARCH TRUST: TRENDS (Mar. 13, 2019), https://trend.pewtrusts.org/en/archive/spring-2019/how-development-of-americas-water-infrastructure-has-lurched-through-history [https://perma.cc/8435-W4HR] (reporting that climate change is making worsening water quantity and quality and analyzing how lack of investment in infrastructure decreases water quality making water not safe to drink); David Shaper, *As Infrastructure Crumbles, Trillions Of Gallons Of Water Lost,* All Things Considered, NPR (2014), https://www.npr.org/2014/10/29/359875321/as-infrastructure-crumbles-trillions-of-gallons-of-water-lost [https://perma.cc/J46S-5LC9].

59. AM. SOC'Y OF CIVIL ENG'RS, 2017 INFRASTRUCTURE REPORT CARD: DRINKING WATER 1 (2017), https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Drinking-Water-Final.pdf [https://perma.cc/XY2F-P6SW].

60. AM. SOC'Y OF CIVIL ENG'RS, 2017 INFRASTRUCTURE REPORT CARD: WASTEWATER 1 (2017), https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Wastewater-Final.pdf [https://perma.cc/QH6P-NZGU].

61. AM. SOC'Y OF CIVIL ENG'RS, *supra* note 59, at 1. "$1 trillion is necessary to maintain and expand service to meet demands over the next 25 years." *Id.*

62. Interview with Raul A. Deju, Partner, Brightstar Capital Partners, https://brightstarcapitalpartners.com/private-equity-opportunities-water-infrastructure-development/ [https://perma.cc/3S7X-EKRD]; TASK FORCE ON FINANCING WATER INFRASTRUCTURE, A TYPOLOGY OF WATER INFRASTRUCTURE INVESTORS, WORLD WATER COUNCIL (2018), https://www.worldwatercouncil.org/sites/default/files/2018-03/Investor_Typology.PDF [https://perma.cc/9HLH-6JV7].

water supply is going to drop an additional 10% due to climate change related impacts.[63] The straightforward impacts of climate change are well known: a raise in temperature translates into more evaporation of water and more droughts because of a decrease in rainfall and snowpack.[64] Less obvious is the decrease in available, clean freshwater as a result of the decrease in water quality.[65] Increased precipitation in certain areas will translate to more pollution runoff.[66] Additionally, raised water temperatures create stress on the ecosystem and allow algae to bloom.[67] The World Economic Forum rated water crisis as the greatest risk we are facing globally.[68] Furthermore, a rise in sea level increases the amount of saltwater intrusion in our coastal aquifers making groundwater not fit for potable uses unless it is treated.[69]

While some may deny climate change,[70] the market certainly has not. Scarce products are valuable, and water is no different. Market actors have seized the opportunity and have been investing in all things water, as the next section will explain. However, that market allocation must have a role to play in water is not the same as saying it is like oil. Water is renewable but irreplaceable.

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63. Nigell Arnell & Chunzhen Liu, *Hydrology and Resources*, *in* CLIMATE CHANGE 2001: IMPACTS, ADAPTATION, AND VULNERABILITY 191, 213–14 tbl. 4–6 (James McCarthy et al. eds., 2001), https://www.ipcc.ch/site/assets/uploads/2018/03/WGII_TAR_full_report-2.pdf [https://perma.cc/CG2U-FAER].

64. *Water and Climate Change*, UNION CONCERNED SCIENTISTS (June 24, 2010), https://www.ucsusa.org/global-warming/science-and-impacts/impacts/water-and-climate-change.html [https://perma.cc/5NNX-H94S].

65. *Id.*

66. *Id.*

67. *Id.*

68. Carl Ganter, *Water Crises Are a Top Global Risk*, WORLD ECON. F. (Jan. 16, 2015), https://www.weforum.org/agenda/2015/01/why-world-water-crises-are-a-top-global-risk/ [https://perma.cc/6EKP-MYDC].

69. CAROLINAS INTEGRATED SCIS. & ASSESSMENTS & S.C. SEA GRANT CONSORTIUM, ASSESSING THE IMPACT OF SALTWATER INTRUSION IN THE CAROLINAS UNDER FUTURE CLIMATIC AND SEA LEVEL CONDITIONS 7–8 (2012), https://cpo.noaa.gov/sites/cpo/Projects/RISA/2013/reports/2012_CISAandSCSeaGrant_SalinitySARPReport.pdf [https://perma.cc/KNU5-6263].

70. Mike Murphy, *Trump Tells '60 Minutes' Climate Change Will Reverse Itself and He Doesn't Want to Lose Jobs Fighting It*, MARKET WATCH (Oct. 15, 2018, 9:50 AM), https://www.marketwatch.com/story/from-climate-change-to-china-to-kavanaugh-heres-what-trump-told-60-minutes-2018-10-14 [https://perma.cc/J6X4-C6TG]; Riley E. Dunlap & Aaron M. McCright, *Climate Change Denial: Sources, Actors and Strategies*, *in* CONSTANCE LEVER-TRACY, ROUTLEDGE HANDBOOK ON CLIMATE CHANGE AND SOCIETY 240 (2010).

III. THE BUSINESS OF WATER: ALL BUT WATER?

A. "Traditional Markets" in Water

This idea of water as an essential part of society is often reflected in broad constitutional declarations about water belonging to the public.[71] To a great extent, governmental management logically follows the publicness of water. In an ideal world, it is expected that government will manage water quantity and quality for present and future generations, not excluding the poorest members of society. However, governments have often been unable to allocate water efficiently and fairly.[72] Many have advocated for water markets as a tool to help resolve the shortcomings of the government's allocation of water rights, particularly in water scarce regions.[73] Governments have had a hard time reallocating existing water rights because those property rights are legally entrenched and because, almost everywhere, the political economy disfavors the reallocation.[74] Plenty of water rights were established a long time ago when agriculture was the main economic activity.[75] As such, even today, most water is allocated to the agricultural sector even though the weight of agriculture in terms of gross domestic product has been substantially reduced: from 37.5% in 1869 to 0.8% in 2006.[76] While it is undeniable that the agricultural sector requires water as an input in most cases while other sectors do not, the agricultural sector is heavily criticized because it is not always efficient.[77] In the western United States, where water is scarce, there are few mechanisms to impose efficient practices on water users. Water rights are defined according to the volume historically diverted and put to beneficial use.[78] Hence, some rights are defined according

71. Joseph Regalia & Noah D. Hall, *Waters of the State,* 59 NAT. RES. J. 59, 68 (2019).

72. CASADO PÉREZ, *supra* note 3, at 22–28 (comparing administrative systems and markets. The latter aggregate information better and are less subject to interest group capture); *see also* James L. Huffman, *Institutional Constraints on Transboundary Marketing*, *in* WATER MARKETING. THE NEXT GENERATION, at 32 (Terry L. Anderson & Peter Jensen Hill eds., 1997).

73. Mateen Thobani, *Tradable Property Rights to Water. How to Improve Water Use and Resolve Water Conflicts,* THE WORLD BANK: VIEWPOINT, no. 34, Feb. 1995, at 1; Henning Bjornlund & Jennifer M. McKay, *Aspects of Water Markets for Developing Countries: Experiences from Australia, Chile, and the U.S.,* 7 J. ENV'T & DEV. ECON. 767 (2002); ANDERSON & SNYDER, *supra* note 27; *see also* Thompson, *supra* note 45.

74. ANDERSON & SNYDER, *supra* note 27, at 21; Morris, *supra* note 36, at 993.

75. Zachary Donohew, *Property Rights and Western United States Water Markets,* J. AG. & RES. ECON. 85, 89 (2009).

76. JULIAN M. ALSTON ET AL., PERSISTENCE PAYS: U.S. AGRICULTURAL PRODUCTIVITY GROWTH AND THE BENEFITS FROM PUBLIC R&D SPENDING 11–12 (2010).

77. *Farms Waste Most of World's Water*, WIRED (Mar. 19, 2006), https://www.wired.com/2006/03/farms-waste-much-of-worlds-water/ [https://perma.cc/4SMH-XTU2].

78. BARTON THOMPSON, JR. ET AL., LEGAL CONTROL OF WATER RESOURCES 169 (5th ed. 2012).

to the amount of water needed to flood irrigate a field of cereal in 1890.[79] Today we could probably use a center-pivot irrigation system which would require far less water.[80] But farmers who hold old water rights may not have an incentive to do so. These farmers may have very old water rights and in prior appropriation—a system based on the premise "first in time, first in right"—[81]they will be the first to receive water if there is not enough for everyone. Using flood irrigation today is not considered a violation of the beneficial use requirement because farming is still a type of beneficial use, and the requirement does not impose a particular irrigation method.[82] Not only it does not impose an efficient irrigation system, it may discourage the voluntary adoption of efficient systems. Prior appropriation rights are subject to a "use it or lose it" principle which implies that a farmer may be wary of shifting irrigation systems if he is going to use less water because he may lose the water he is not using.[83] While the forfeiture based on "use it or lose it" aims at preventing speculation, the unintended consequence is that it pushes farmers to use all their right even if they could do without some.

Making water rights transferable gives incentives to farmers to use less water and sell the rest to whoever values it most.[84] Hence, farmers may shift toward more efficient irrigation practices if either water is too scarce and they do not get enough or if they can profit from transferring their surplus water. In other words, a market achieves this efficient allocation because it gives incentives to low-value users to sell their water to higher-value users because low-value users may get a higher benefit selling the water than using it.[85] The paradigmatic transaction is between the agricultural sector, where historically most water has been allocated, and urban areas, where water is highly valued. Some farmers may fallow their fields and not produce in order to sell water, but others will just invest in efficient irrigation methods.[86] Some farmers may even

79. *Id.* at 171 (explaining the principle of first in time, first in right); ADLER ET AL., *supra* note 22, at 121–29. In particular, the case Tulare Irrigation Dist. v. Lindsay-Strathmore Irrigation Dist., 45 P.2d 972 (Cal. 1935), offers an example of how prior appropriation rights operate.

80. Andy Oerman, *Flood Irrigation vs. Center Pivot Irrigation* (Feb. 22, 2018), http://blog.valleyirrigation.com/valley-irrigation/us/mediaroom/growing-the-conversation-blog/blog-home/flood-irrigation-vs.-center-pivot-irrigation [https://perma.cc/Y3EN-L26Q].

81. THOMPSON ET AL., *supra* note 78, at 171.

82. Janet C. Neuman, *Beneficial Use, Water, and Forfeiture: The Inefficient Search for Efficiency in Western Water Law*, 28 ENVTL. L. 919, 934, 975–76 (1998).

83. PETER W. CULP ET AL., SHOPPING FOR WATER: HOW THE MARKET CAN MITIGATE WATER SHORTAGES IN THE AMERICAN WEST, HAMILTON PROJECT 16 (Brookings ed. 2013).

84. *Id.* at 7.

85. CASADO PÉREZ, *supra* note 3, at 10, 23–24.

86. CULP ET AL., *supra* note 83, at 22.

innovate in other ways such as producing dry-farming, a technique that withdraws irrigation of crops beyond the seedling stage.[87]

Water rights markets are not free markets though. They are very different than the markets for commodities.[88] The nature of water and the water distribution system implies that a free water market may suffer from failures.[89] The visible hand of government is necessary for a water rights market to work. This intervention translates to rules ensuring that parties to a transaction do not cause negative externalities to third parties or the environment.[90] Changes in water rights are subject to the no-injury rule.[91] In addition, government undertakes functions that enhance water markets by providing information on transactions or offering a water rights registry.[92] Finally, it is important to note that water markets are a mechanism of adjustment, not the main tool to allocate water rights.

It is important to note that these traditional water markets are inherently local. They are local as a result of the natural characteristics of water and, sometimes, regulation.[93] Water, compared to other commodities, has natural ways to transport itself: rivers. But when those rivers do not connect areas with different valuation of water, we need man made infrastructure. Man-made infrastructure is truly

87. Ari Levaux, *Is Dry Farming the Next Wave in a Drought-Plagued World?*, NAT'L GEOGRAPHIC (Sept. 29, 2016), https://www.nationalgeographic.com/people-and-culture/food/the-plate/2016/09/can-dry-farming-lead-the-way-out-of-drought-/ [https://perma.cc/H8BG-V3P4].

88. Jedidiah Brewer et al., *Water Markets in the West: Prices, Trading, and Contractual Forms* 3 (NBER Working Paper Series, Paper No. 13002, 2007), http://www.nber.org/papers/w13002.

89. CASADO PÉREZ, *supra* note 3, at 37–39.

90. *Id*. at 66.

91. ADLER ET AL., *supra* note 22, at 154–155.

92. CASADO PÉREZ, *supra* note 3, at 10, 23–24.

93. ELLEN HANAK, WHO SHOULD BE ALLOWED TO SELL WATER IN CALIFORNIA? THIRD-PARTY ISSUES AND THE WATER MARKET iii (2003) (describing how counties have enacted regulation to control transfers of water from their jurisdiction to others); Gary D. Libecap, *Water Rights and Markets in the U.S. Semiarid West, Efficiency and Equity Issues in* PROPERTY IN LAND AND OTHER RESOURCES 389, 390 (Daniel H. Cole & Elinor Ostrom eds., 2012) ("Most western water markets are local. Trading is confined within water basins and sectors (among adjacent irrigators, for example). Typically, exchange outside a water basin is limited, and voluntary private transactions to move water from agriculture to urban use are often very costly and, in some cases, extremely contentious. There is virtually no private water trading across state boundaries"); KATHLEEN HARTNETT WHITE ET AL., THE CASE FOR A TEXAS WATER MARKET 12 (2017), https://files.texaspolicy.com/uploads/2018/08/16103756/2017-04-RR-WaterMarkets-ACEE-KHartnettWhite.pdf [https://perma.cc/E6CA-JPML] (describing how groundwater districts have tried to prevent exports of groundwater); CULP ET AL., *supra* note 83, at 16 (describing the obstacles that irrigation districts put to farmers trying to transfer the water).

expensive.[94] Water is far more expensive to transfer than energy or gas.[95] The cost of transporting it 100 kilometers represents about 50% of the wholesale cost of water, while the equivalent is 2.5% for natural gas and 5% for electricity.[96]

In fact, transportation costs make some of the deals less attractive. T. Boone Pickens, via his company Mesa Inc., wanted to make billions out of the Ogallala River by quenching the thirst of the ever-growing Dallas–Fort Worth Metroplex and San Antonio, but he could not find buyers.[97] T. Boone Pickens managed to get the Texas Legislature to allow him to create the Roberts County Fresh Water Supply District No.1 and via the District, got eminent domain powers to condemn the land it needed for pipelines between the Texas Panhandle and Dallas[98] But, transportation costs were prohibitive.[99] He could not find a buyer even during the 2009 extreme drought Texas suffered.[100] While he claimed to be patiently waiting for the market to peak,[101] he ended up selling the water rights to the Canadian River Water Authority, which serves, among others, the City of Amarillo in the Texas panhandle, for over $100 million.[102] Not a bad deal, but not an incredible one either.

Accordingly, water markets are naturally more local. That does not mean that water moguls may not have a role to play. For example, if someone were to find a huge aquifer near a growing urban area, she would certainly enter into good deals. However, water markets are also local because, as Section V.B. explains, communities are trying to protect the basin and their economic life by restricting how much water can be transferred out of the basin or by making the procedure to get approval to transfer water very onerous. Furthermore, the

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94. Yuan Zhou & Richard S. J. Tol, *Evaluating the costs of desalination and water transport,* 41 WATER RESOUR. RES. 7–8 (2005) (reviewing the literature on water transportation costs to estimate the costs of transporting desalinated water); Rachel Layne, *Water Costs Are Rising Across the U.S.—Here's Why,* CBS NEWS: MONEYWATCH (Aug. 27, 2019, 3:10 PM), https://www.cbsnews.com/news/water-bills-rising-cost-of-water-creating-big-utility-bills-for-americans/ [https://perma.cc/3FWT-STZK].

95. Vicki Waye & Christina Son, *Regulating the Australian Water Market*, 22 J. ENVTL. L. 431, 438 (2010); *see* Alexander Gee, *Competition and the Water Sector*, ANTITRUST, Summer 2004, at 38, 38.

96. Gee, *supra* note 95, at 38.

97. PRUD'HOMME, *supra* note 46, at 262–64.

98. *Id.* at 263.

99. *Id.*

100. *Id.* at 264–65

101. *Id.* at 265.

102. *Pickens, Texas Water Supplier Sign $103M Deal*, BEAUMONT ENTERPRISE (June 23, 2011, 4:05 PM), https://www.beaumontenterprise.com/news/article/Pickens-Texas-water-supplier-sign-103M-deal-1437581.php [https://perma.cc/4CCZ-UXQH]. The Canadian River Water Authority's board of directors is composed of seventeen members appointed by the cities the Water Authority serves. *Board of Directors*, CANADIAN RIVER MUN. WATER AUTH., https://www.crmwa.com/board-of-directors [https://perma.cc/93S9-5EF4].

no-injury rule may make transactions more local since, as soon as a transaction sends water far away, the potential for environmental and third-party externalities increases.[103] An illustration of this is the transactions that, in California, required water to pass through the San Joaquin and Sacramento River Deltas.[104] These would be most transactions from the humid North to the arid South in the Golden State. All of these transactions are subject to a heightened scrutiny.

While traditional water markets are not exempt from problems, water markets understood broadly are much more challenging. While sometimes these water markets just enhance the negative effects predicated of traditional water markets, they also present new challenges as next section will highlight.

B. Privatization of Water Utilities

Following the same line of reasoning that counsels the introduction of water markets, many defend water utilities privatization. Those who defend privatization argue that private actors do a better job than local authorities in ensuring the water supply for urban areas.[105] Governmental entities find access to financing challenging for the large sums of capital needed to update water infrastructure.[106] If public authorities were to embark on such an investment, rates would have to increase considerably. In contrast, a private provider can access funding and provide water more efficiently, and, thus, cheaply.[107] Furthermore, privatization is perceived by some as making

103. Libecap, *supra* note 94, at 402.

104. CAL. STATE WATER RES. CONTROL BD., GUIDE TO WATER TRANSFERS Figure 1 (1999) (if transfers have to go through CALFED—the entity managing the Sacramento-San Joaquin Delta—the transaction is subject to further requirements.).

105. Adam Millsap, *Privatizing Water Facilities Can Help Cash-Strapped Municipalities*, FORBES (Oct. 5 2016, 9:59 AM), https://www.forbes.com/sites/adammillsap/2016/10/05/privatizing-water-facilities-can-help-cash-strapped-municipalities/#2b46c5734b5c [https://perma.cc/T2VY-7ZL9].

106. Lakis Polycarpou, *What is the Benefit of Privatizing Water?*, COLUMBIA UNIV.: STATE OF THE PLANET (Sept. 2, 2010), https://blogs.ei.columbia.edu/2010/09/02/what-is-the-benefit-of-privatizing-water/ [https://perma.cc/F5GJ-NWEU].

107. Joseph W. Dellapenna, *Climate Disruption, The Washington Consensus, and Water Law Reform*, 81 TEMP. L. REV. 383, 402–04 (2008).

water policy less subject to corruption and interest group influence.[108] In contrast, those critiquing it consider that privatization agreements are themselves the result of corruption.[109]

Privatization usually takes three different forms.[110] First, complete privatization, a model followed by the United Kingdom, implies full ownership of the delivery and treatment systems.[111] Second, long-term concessions, like the French model, are schemes where the private company takes over the operation and maintenance of the water delivery and sewage infrastructure. In this model, the company is in charge of charging consumers to recover the cost and make a profit.[112] Last, there is the model where the government contracts a company to run the system for a previously agreed fee.[113] Privatization has often not met expectations, and some cities, such as Paris, have backpedaled.[114]

Opposition to water privatization rallies people everywhere.[115] In the developing world, the World Bank required privatization of water utilities in order to access the water loans offered by the international organization.[116] There, often, privatization was not well received, as the most well-known example, the Cochabamba water wars,[117] illustrates. The anti-privatization movement was not wrong in fearing that water rates would increase. In practice, the privatization of utilities has produced uneven results. The promise of lower rates and necessary

108. JAMES SALZMAN, DRINKING WATER: A HISTORY 201 (2013); *see also* PETER H. GLEICK ET AL., THE NEW ECONOMY OF WATER: THE RISKS AND BENEFITS OF GLOBALIZATION AND PRIVATIZATION OF FRESH WATER 28 (2002) (reviewing Mexico's corrupt public provision of tankered water).

109. John Vidal, *Water Privatisation: A Worldwide Failure?*, GUARDIAN (Jan. 30, 2015, 8:09 AM), https://www.theguardian.com/global-development/2015/jan/30/water-privatisation-worldwide-failure-lagos-world-bank [https://perma.cc/M463-PEJ4]; *see also* K. Bayliss, *Privatization and Poverty: The Distributional Impact of Utility Privatization*, 73 ANNALS PUB. & COOPERATIVE ECON. 603, 619 (2002); GLEICK ET AL., *supra* note 108, at 42.

110. BARLOW & CLARKE, *supra* note 9, at 89.

111. *Id.*

112. *Id.*

113. *Id.*

114. Bernard Barraqué, *Return of Drinking Water Supply in Paris to Public Control*, 14 WATER POL'Y 903, 903–04 (2012).

115. Encyclical Letter from Pope Francis, on Care for Our Common Home 23–24 (2015) (warning against the risks of privatization and the role multinational corporations in the allocation of water).

116. Violeta Petrova, *All the Frontiers of the Rush for Blue Gold: Water Privatization and the Human Right to Water,* 31 BROOK. J. INT'L L. 577, 577–78 (2006).

117. Tanya Kapoor*, Is Successful Water Privatization a Pipe Dream?: An Analysis of Three Global Case Studies*, 40 YALE J. INT'L L. 157, 163–67 (2015); Timothy O'Neill, *Water and Freedom: The Privatization of Water and Its Implications for Democracy and Human Rights in the Developing World*, 17 COLO. J. INT'L ENVTL. L. & POL'Y 357, 357–64, 383 (2006); Rhett B. Larson, *The New Right in Water*, 70 WASH. & LEE L. REV. 2181, 2195–98 (2013).

investment has not been fulfilled.[118] Often, rates have gone up.[119] In addition, the need to provide safe drinking water to the low-income population requires cross-subsidization.[120]

Opposition to water privatization has become a central tenet of the anti-globalization movement.[121] For example, the left-wing populist Five Star Movement in Italy had opposition to privatization of water as one of their five pillars.[122] Closer, in Felton, a town on the California coast, Friends of Locally Owned Water organized bake sales, dances, and marches against the private companies that had acquired control of the town's water system and planned to increase rates to fund infrastructure improvements.[123]

For the United States, a bit of history is illuminating. While in many U.S. cities, private companies were initially the suppliers of water, local governments soon took over.[124] Starting in the 1890s, the number of public municipal suppliers became higher than private ones.[125] Today 33 of 52 states and territories have more public than private water systems, and 50 of 52 states and territories have a larger portion of their population served by public water systems.[126] The pendulum of history swings though. Some cities with public water utilities privatized them only to then have to buy them again when the auspicious expectations of better service were not realized. A well-known case is Atlanta.[127] In 1999, United Water, a filial of Suez North America, and Atlanta entered into a deal.[128] United Water was supposed to manage Atlanta's water system until 2019.[129] In 2003, the

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118. GLEICK ET AL., *supra* note 108, at 30.

119. *Id.*

120. *Id.* at 29.

121. SALZMAN, *supra* note 108, at 22.

122. Dave Keating, *On Energy, Italy's Five Star Movement Could Rock the Boat*, FORBES (Mar. 5, 2018, 7:23 AM), https://www.forbes.com/sites/davekeating/2018/03/05/on-energy-italys-five-star-movement-could-rock-the-boat/#2a30a12e6006 [https://perma.cc/4RJ2-3NBK].

123. PRUD'HOMME, *supra* note 46, at 272–73; *see also* ALAN SNITOW ET AL., THIRST: FIGHTING THE CORPORATE THEFT OF OUR WATER 49–62 (2007).

124. *See* NAT'L RESEARCH COUNCIL ET AL., PRIVATIZATION OF WATER SERVICES IN THE UNITED STATES: AN ASSESSMENT OF ISSUES AND EXPERIENCE 34 (2002).

125. *Id.*

126. Andrea Kopaskie, *Public vs Private: A National Overview of Water Systems*, UNC ENVTL. FIN. CTR.: ENVTL. FIN. BLOG (Oct. 19, 2016), http://efc.web.unc.edu/2016/10/19/public-vs-private-a-national-overview-of-water-systems/ [https://perma.cc/SE97-BNUF].

127. Douglas Jehl, *As Cities Move to Privatize Water, Atlanta Steps Back*, N.Y. TIMES (Feb. 10, 2003), https://www.nytimes.com/2003/02/10/us/as-cities-move-to-privatize-water-atlanta-steps-back.html [https://perma.cc/NUQ8-BXHP].

128. *Id.*

129. *Id.*

city backpedaled.[130] United could not offer reliable service.[131] The challenges that the disrepair of the system posed were too large for this to be profitable without a huge price spike. [132]

While opposition to privatization has been strong, privatization of some water functions and the public nature of water do not need to be at odds. If they did, even water use rights in the hands of private individuals could be subject to the same critique. Privatization efforts are not going away. The focus, thus, should be on making privatization compatible with the publicness inherent to water,[133] as a report by the Pacific Institute does.[134] This report proposes several requirements for water privatization agreements. The agreements must ensure, among others, that: (i) every person must receive a certain amount of water because water is a social good, (ii) water must be managed based on sound economic principles -for example, companies need to exhaust all water conservation measures before new investment to increase supply is allowed, (iii) public agencies should keep control over water.[135]

Beyond these requirements, it is important to recognize that privatization does not necessarily mean competition. It is often said that the market will cure many of the evils of government regulation but for that to happen the market should be a competitive one.[136] Competition keeps companies in check. None of these privatization models per se guarantee competition in the water market beyond the initial competitive bids—assuming more than one company presents their offers—for the long-term contracts with local governments. Often the companies who bid are one of the few water giants.[137] For that, markets should be open to multiple companies, and water infrastructure should be regulated as a natural monopoly, as we have done in power markets in some areas, like most of Texas.[138] In those markets, any company can ship their power or water through pipelines or

130. *Id.*

131. *Id.*

132. *Id.*

133. Some authors may consider that in practice there is no privatized model that can be compatible with water's public value. The work of Maude Barlow is significant in this area. BARLOW & CLARKE, *supra* note 9; *see also* MAUDE BARLOW, BLUE FUTURE: PROTECTING WATER FOR THE PEOPLE AND THE PLANET FOREVER (2013); MAUDE BARLOW, BLUE COVENANT: THE GLOBAL WATER CRISIS AND THE COMING BATTLE FOR THE RIGHT TO WATER (2007).

134. *See generally* GLEICK, *supra* note 108.

135. *Id.* at 40–42.

136. Millsap, *supra* note 105.

137. According to Veolia, Vivendi's water branch, 2017 results, it serves more than 100 million people all over the world. Press Release, Veolia, 2017 Annual Results (Feb. 22, 2018), https://www.veolia.com/sites/g/files/dvc2491/files/document/2018/02/PR-RA2018-Veolia-220218-ENG.pdf [https://perma.cc/SAT4-QLS4].

138. Dylan Baddour, *Texas' Deregulated Electricity Market, Explained*, HOUS. CHRON. (June 8, 2016), https://www.houstonchronicle.com/local/explainer/article/texas-electric-deregulation-ERCOT-TCAP-7971360.php [https://perma.cc/9RJ9-MGYM].

electric lines that someone else owns without being discriminated against by having to pay higher prices.[139] England and Wales's water markets are open for competition under the monitoring of the independent energy entity Ofwat.[140] But the British example is the exception more than the rule. Hence, privatization alone cannot bring all the consumer benefits predicated from markets. Without implementing a full-fledged, albeit not unregulated, market, governments should monitor more the performance of the private companies in charge of their water systems. One way to do so is by implementing benchmark regulations where you hold a local water company, de facto operating a monopoly, accountable by comparing it with its peers.[141] Benchmark regulation is also a way to fulfill the governmental control that the Pacific Institute's report defends.[142]

C. New Investment in Water Market: Water-related Businesses

At the end of the movie *The Big Short*, we learned that Michael Burry, who shorted Wall Street's financial sector, was moving to water.[143] These investments are indeed taking place in 2019. Investment funds, international corporations and wealthy businessmen are making true the aphorism "water is the new oil."[144] Market actors are profiting from climate change by investing in an asset—water—that is

139. Paul L. Joskow & Roger G. Noll, *The Bell Doctrine: Application in Telecommunications, Electricity, and Other Network Industries,* 51 STAN. L. REV. 1249, 1252–1253 (1999); Morriss, *supra* note 36, at 999–1000 (on water markets and natural monopolies); CULP ET AL., *supra* note 83, at 22 (discussing non-discriminatory wheeling provisions to ensure third-party access to water infrastructure in a water market).

140. Since 2017, large consumers—businesses—can choose their water provider. Before they were subject to the same local monopoly as households. *Water Is Open for Business*, OPEN WATER, https://www.open-water.org.uk [https://perma.cc/R982-MT2K].

141. EURAU, HOW BENCHMARKING IS USED IN THE WATER SECTOR 2 (2015), http://www.eureau.org/resources/position-papers/135-benchmarking-october2015/file [https://perma.cc/PKP7-REAN].

142. GLEICK ET AL., *supra* note 108, at 37.

143. THE BIG SHORT (Paramount Pictures 2015). For a review, see A.O. Scott, *Review: In 'The Big Short,' Economic Collapse for Fun and Profit,* N.Y. TIMES (Dec. 11, 2015), https://www.nytimes.com/2015/12/11/movies/review-in-the-big-short-economic-collapse-for-fun-and-profit.html [https://perma.cc/237R-GAKA]. In fact, "The Big Short" was also the title of a flyer used by those opposing the bill that would have blocked a major groundwater transaction between the farming company Cadiz Inc. in the Mohave Desert and Southern California urban centers. The flyer claimed that those favoring the bill and opposing the transaction had only in mind their own profits as they were betting against the company on the financial markets and benefited from the decrease in Cadiz's stock price. Ian James & Evan Wyloge, *Bill Targeting Company's Plan to Pump Desert Groundwater Dies in California Senate*, DESERT SUN (Aug. 31, 2018, 7:56 PM), https://www.desertsun.com/story/news/environment/2018/08/31/bill-would-hinder-cadiz-water-project-stalls-california-senate/1158059002/ [https://perma.cc/8ZXB-3LXX].

144. Another way to put it is that "blue is the new green." SALZMAN, *supra* note 108, at 22.

going to become more and more valuable. So far, the investment has focused on all things water but water itself, but this is also changing, and investors are trying to invest in water rights.

As a result of water scarcity and the consequent business opportunities, we expect the large, established, international water players to invest in water in the United States. For example, Suez Lyonnaise, the global leader in water, has been a player since 1999, when it acquired control of United Water, a water distribution business.[145] Parallel to this, some companies or wealthy individuals have diversified their portfolio of products to include water business lines. Examples of this diversification are General Electric[146] and oil tycoons, like T. Boone Pickens.[147] Plenty of business sectors are in a position to benefit from climate change. Beyond bottled water and water utilities, companies manufacturing water-efficient appliances or water purification systems are expected to do better thanks to climate change.[148]

Even individual investors are seeking to invest in companies engaging in water-related businesses.[149] These individual investors can invest in traditional international water companies like the well-known French company Suez or the less well-known U.S. company, PICO Holdings,[150] new entrants in the water business like General Electric, or identify the companies in the specialized indexes like Dow Jones U.S. Water Index.[151] This index is composed of 29 stocks including Aqua America and California Water Service Group, both water utilities holding companies that operate subject to the regulation of public

145. John Carreyrou & Amy Barrett, *Suez to Buy United Water for $1 Billion, Making French Firm World's Leader*, WALL STREET J. (Aug. 24, 1999, 12:26 AM), https://www.wsj.com/articles/SB935388456565689774 [https://perma.cc/NP3S-2PW9].

146. James McWhinney, *Water Investments: How to Invest in Water,* INVESTOPEDIA (June 25, 2019), https://www.investopedia.com/articles/06/water.asp [https://perma.cc/Q7N8-474S].

147. Dwinnell, *supra* note 34.

148. BRIAN GRAY ET AL., ALLOCATING CALIFORNIA'S WATER: DIRECTIONS FOR REFORM 7 (2015), https://www.ppic.org/content/pubs/report/R_1115BGR.pdf [https://perma.cc/ZY8D-4PVY].

149. *Id.*

150. PICO acquires water rights and water related assets, such as storage rights, in Arizona, Nevada, Colorado, and New Mexico. *PICO–PICO Holdings, Inc.*, SEEKING ALPHA (Sept. 20, 2019, 4:00 PM), https://seekingalpha.com/symbol/PICO/overview [https://perma.cc/5P79-KVS2]; *Investor Relations*, PICO HOLDINGS, http://picoholdings.com/core-businesses.html [https://perma.cc/HW5N-7LJJ]. Seventy-two percent of their shareholders are institutional investors which shows the credibility of the firm. *How Many PICO Holdings Inc (NASDAQ:PICO) Shares Do Institutions Own?*, SIMPLY WALL STREET (Nov. 19, 2018), https://simplywall.st/stocks/us/commercial-services/nasdaq-pico/pico-holdings/news/how-many-pico-holdings-inc-nasdaqpico-shares-do-institutions-own/ [https://perma.cc/DKD6-SBZZ].

151. *Dow Jones US Water (DJUSWU)*, MKT. SCREENER (Sept. 20, 2019, 11:51 AM), https://www.marketscreener.com/DOW-JONES-US-WATER-454711/components/ [https://perma.cc/Y6VF-FVW8].

utilities commissions in several states such as: Pennsylvania, Ohio, Texas, California, New Mexico, Hawaii, and Washington.[152] Another index that we can use as an example is the S&P Global Water Index, which traces fifty water utilities and water infrastructure companies around the world. S&P Global Water Index[153] includes companies from water utilities, to a company producing flushing systems and pipes (Geberit Group)[154] and Danaher, a conglomerate which has water diagnosis and purification among its lines of business.[155]

Beyond direct investment, there are some exchange-traded funds—investment funds that are traded in stock exchanges and that hold different company stocks—devoted to water companies.[156] Investors often use these commodity-based funds to hedge their investments in other assets.[157] The most prominent water exchange-traded fund is Invesco Water Resources, with $865 million in assets under management in 2018, with a focus only on U.S. water-related companies, among them Danaher Corporation.[158] Other funds are Invesco S&P Global Water ETF, which tracks the S&P Global Water Index,[159] and the Invesco Global Water ETF, which focuses on water conservation and purification companies.[160]

All this investment has proven wrong the claims about water regulation deterring investment and stifling innovation.[161] In fact, there are even start-ups focused on water innovation.[162] As with almost any product, when value goes up, investment flows into water.

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152. *Overview*, AQUA AM., https://www.aquaamerica.com/about-aqua/overview.aspx (last visited Nov. 20, 2019); *About Us*, CAL. WATER SERV. GRP., https://www.calwatergroup.com/about-us/ [https://perma.cc/28R5-AAL2].

153. *S&P Global Water Index*, S&P DOW JONES INDICES, https://us.spindices.com/indices/equity/sp-global-water-index [https://perma.cc/GMZ5-H78N].

154. *Product Range*, GEBERIT GRP., https://www.geberit.com/products/product-range/ [https://perma.cc/TQ8V-Z5HJ].

155. *Our Businesses*, DANAHER, http://www.danaher.com/our-businesses [https://perma.cc/VJX8-BUAB].

156. GRAY ET AL., *supra* note 148.

157. Dan Caplinger, *What Is an ETC?*, THE MOTLEY FOOL (Aug. 7, 2019, 3:57 PM), https://www.fool.com/investing/etf/what-is-an-etf-exchange-traded-fund.aspx [https://perma.cc/963Q-Q4BF].

158. *Invesco Water Resources ETF*, INVESCO (June 30, 2019), https://www.invesco.com/static/us/investors/contentdetail?contentId=d15407c649400410VgnVCM10000046f1bf0aRCRD&dnsName=us [https://perma.cc/K56G-J7EZ].

159. *Id.*

160. *Id.*

161. NEWSHA K. AJAMI ET AL., THE PATH TO WATER INNOVATION, HAMILTON PROJECT 11–14 (2014), https://www.hamiltonproject.org/assets/legacy/files/downloads_and_links/path_to_water_innovation_thompson_paper_final.pdf [https://perma.cc/WE4E-XW38].

162. *Aquaoso*, WATER INNOVATION PROJECT, http://www.waterinnovationproject.com (last visited Sept. 20, 2019).

D. Investing in Water as an Asset

1. New Forms of Water: Desalination, Reuse

As water becomes scarce, technology once again steps in to save the day.[163] For a long time, engineers dominated water policy.[164] Dams were built everywhere to smooth the annual supply of water by storing winter and spring rains for those times of the year when it rains less.[165]While they did not increase water supply in terms of overall quantity, they did ensure that more of it could be effectively used when needed.[166] Dams are now disfavored given their environmental consequences.[167] But we are back at often believing that technology will pave our way out of water scarcity by increasing supply, particularly through desalination and water reuse technologies.

Desalination is the technique of transforming ocean water into potable water for our everyday uses.[168] Desalination can also be applied to brackish groundwater.[169] Texas, California, and Florida, three of the four states that consume the most freshwater, have turned to the ocean to solve their water scarcity problems.[170] Desalination is not without negative environmental consequences: from the effect on ocean currents, to the high volume of energy it consumes, to what to do with the brine.[171] Desalination is still a small part of the water supply,[172] but it is a growing industry.[173]

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163. Eric Wesselman & Ron Stork, *To Avoid Catastrophe, Don't Build More Dams*, S.F. CHRON. (Feb. 15, 2017), https://www.sfchronicle.com/opinion/openforum/article/To-avoid-catastrophe-don-t-build-more-dams-10935707.php [https://perma.cc/GT3B-UVM7].

164. *Id. See also* Dave Owen & Colin Apse, *Trading Dams*, 48 U.C. DAVIS L. REV. 1043, 1061 (2015).

165. MICHAEL COLLIER ET AL., DAMS AND RIVERS: A PRIMER ON THE DOWNSTREAM EFFECTS OF DAMS 1–7 (1996).

166. *Id.*

167. *Id.*

168. THOMPSON ET AL., *supra* note 79, at 22.

169. *Id.*

170. John Duff et al., *Prospects and Pitfalls of Desalination Development: Insights from Three States*, 22 OCEAN & COASTAL L. J. 130, 131 (2017).

171. *Why Desalination Is Not the Answer to the World's Water Issues*, HYDROFINITY (Oct. 16, 2018), https://www.hydrofinity.com/blog/why-desalination-is-not-the-answer-to-the-worlds-water-issues [https://perma.cc/F5DT-GKM2].

172. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-14-430, FRESHWATER SUPPLY CONCERNS CONTINUE, AND UNCERTAINTIES COMPLICATE PLANNING 31, 40 (2014), https://www.gao.gov/assets/670/663343.pdf [https://perma.cc/99S6-LND3].

173. *U.S. Desalination Industry Expands Since 2000; Seen as Essential to Meeting Supply Needs*, BLOOMBERG (Aug. 22, 2013, 12:00 AM), https://news.bloombergenvironment.com/environment-and-energy/us-desalination-expands-since-2000-seen-as-essential-to-meeting-supply-needs [https://perma.cc/6X23-T4WY].

Similarly, recycled water is a growing source of water. Although all water is reused given the hydrological circle,[174] water reuse refers to further treating wastewater so that it can be put to potable uses either by subjecting it to, among other processes, reverse osmosis, filtration, and UV radiation systems,[175] or by complementing those with an environmental buffer.[176] The former is direct potable reuse and, the latter, indirect potable reuse because the recycled water is not immediately pumped back into the system, but discharged into a lake, river, or aquifer.[177] For example, in Texas, water reuse is an increasingly important source of water.[178] The 2017 State Water Plan expects reuse to cover more than 14% of the annual demand of water by 2070, as it will be more affordable than other sources, including in some areas, water conservation.[179]

Municipal water suppliers are likely to invest in both desalination[180] and reuse in the near future, particularly as they become price competitive.[181] Companies are likely to invest into making these technologies cheaper and more environmentally friendly.[182] These new sources can quench part of the increase in demand. Their presence lowers the value of investing in existing water rights in groundwater or surface water. Desalination and reuse increase supply, thus, lowering the price of water. However, reuse can have negative systemic effects as Section IV.E.2 explains. Desalination poses

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174. NATIONAL RESEARCH COUNCIL ET AL., WATER REUSE: POTENTIAL FOR EXPANDING THE NATION'S WATER SUPPLY THROUGH REUSE OF MUNICIPAL WASTEWATER 25 (2012).

175. NEJLAH HUMMER & SUSANNA EDEN, POTABLE REUSE OF WATER 2 (2016), https://watereuse.org/wp-content/uploads/2015/01/arroyo-2016-5-6-16.pdf [https://perma.cc/X6SG-E8M9].

176. U.S. ENVTL. PROTECT. AGENCY, 2017 POTABLE REUSE COMPENDIUM i (2017), https://www.epa.gov/sites/production/files/2018-01/documents/potablereusecompendium_3.pdf [https://perma.cc/QQJ2-ECDP].

177. *Ground Water and Drinking Water: Potable Water Reuse and Drinking Water*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/ground-water-and-drinking-water/potable-water-reuse-and-drinking-water [https://perma.cc/5VYW-B9ZZ].

178. TEX. WATER DEV. BD., 2017 STATE WATER PLAN 6–8 (2017), http://www.twdb.texas.gov/waterplanning/swp/2017/doc/SWP17-Water-for-Texas.pdf?d=4143 [https://perma.cc/54DJ-QF2U].

179. *Id.* at 90.

180. Nikolay Voutchkov, *Desalination – Past, Present and Future*, INT'L WATER ASS'N (Aug. 17, 2016), http://www.iwa-network.org/desalination-past-present-future/ [https://perma.cc/8CXF-Q7MV] ("An expected US$10 billion investment [from 2016 to 2021].").

181. For desalination, see TEX. WATER DEV. BD., *supra* note 178, at 89 (predicting costs to get lower within five years and even more within twenty years). For reuse, see the chart comparing the cost of different water sources in Texas. *Id.*

182. Sarah Goodyear, *Innovators Are Chasing a Cheaper Future for Desalination*, NEXT CITY (Nov. 12, 2014), https://nextcity.org/daily/entry/drought-resilience-desalination-plant-california [https://perma.cc/MFL8-D4AM]; Kristin Majcher, *How Can Desalination Become Cheaper?*, MIT TECH. REV. (Dec. 3, 2014), https://www.technologyreview.com/s/532891/how-can-desalination-become-cheaper/ [https://perma.cc/D2JF-QPVD].

environmental risks, as it consumes lots of energy, not always clean, and it may affect ocean ecosystems by changing currents. Its brine disposal is challenging.[183]

2. Groundwater

T. Boone Pickens, the Oklahoma-born oil tycoon, has exchanged oil for water. Pickens has bought 200,000 acres of land in the Texas panhandle to get its corresponding groundwater rights for about $75 million. His expected return is above $1 billion by selling it to Texas's ever-growing urban areas.[184] But Pickens is not the only one.[185] Groundwater ranching, that is, buying "water from distant rural landowners for the sole purpose of exporting, or piping, water for uses many miles removed from the land" has been practiced for more than 50 years in Texas[186] but it has picked up. Groundwater prices in Texas have increased up to 344% from their level in the 2000s.[187]

3. Surface Water

Roughly, there are two water rights regimes in the United States. The East follows a riparian system, and, the West, a prior appropriation one.[188] In a riparian system, water rights are tied with land ownership.[189] Under this common law doctrine, the owner of riparian land has "the right to make reasonable use of the water, subject to the equal rights of other riparians on the same waterbody."[190] Thus, riparian water users do not own the water itself but have a usufructuary right to the water.[191] Riparian rights cannot be transferred separately from the riparian land.[192] However, a riparian landowner could transfer the land and reserve the water rights[193] or could grant an easement to access the water to a third party. Such an easement,

183. Sabine Lattemann & Thomas Höpner, *Environmental Impact and Impact Assessment of Seawater Desalination*, 220 DESALINATION 1, 3 (2008).

184. Dwinnell, *supra* note 34.

185. *How to Make a Killing Selling Water Rights*, UNUSUAL INV., https://unusualinvestments.com/invest-in-water-rights/ [https://perma.cc/EL34-H8R8] (recommending investment in groundwater in Texas).

186. BRUCE LESIKAR ET AL., QUESTIONS ABOUT GROUNDWATER CONSERVATION DISTRICTS IN TEXAS 11 (Kelly Mills eds., 2002).

187. *The Value of Water*, WATER MKTS. LLC: WATER BLOG (Apr. 3, 2018), https://watermarkets.us/tag/texas-water-prices/ [https://perma.cc/B6PA-T5WS].

188. ADLER ET AL., *supra* note 22, at 23.

189. *Id.*

190. *Id.*

191. *Id.*

192. DAVID H. GETCHES ET AL., WATER LAW IN A NUTSHELL 53, 196 (2015).

193. THOMPSON ET AL., *supra* note 78, at 25.

though, is only enforceable against the grantor.[194] In regulated riparianism states, that is, states where users are required to apply for a water use permit before an agency, the permit may be sold but only when title to the riparian land is transferred and only for use in the riparian land.[195] Prior appropriation is the system of the West because riparianism was not fit for the challenges of arid climates.[196] [Prior appropriation, based on the rules of mining camps,[197] grants a right to use water to whoever puts water to beneficial use. There is no requirement to use it in riparian lands.[198]

Prior appropriation rights are transferable,[199] provided the transfer does not harm third parties.[200] This rule applies to old common-law rights as well as rights granted by an agency nowadays.[201] The implementation of the no-injury rule is different though. In the case of old common-law prior appropriation rights, third parties affected are able to challenge a transaction before a court.[202] For permittees, the procedure is a bit more cumbersome. Those who want to transfer the right need in most cases to ensure the approval of a water agency beforehand.[203] While in pure prior appropriation systems there are no restrictions on where the water can be used, a change in the place of use as a result of a transfer requires approval as it may harm other users.[204]

Given all these regulatory controls, water agencies have often played the role of brokers.[205] But as water markets have grown and become more sophisticated, private companies have also taken on that

194. *Id.* at 32.

195. Ronald G. Cummings et al., *Water Rights Transfers: Options for Institutional Reform* 9 (Ga. State Univ. Andrew Young Sch. of Policy Studies & Albany State Univ. Flint River Water Planning & Policy Ctr., Water Policy Working Paper No. 2001–01, 2001).

196. Daina Dravnieks Apple, *Evolution of U.S. Water Policy: Emphasis on the West*, 24 WOMEN IN NAT. RES. 3 (2003–2004), https://www.webpages.uidaho.edu/winr/applewater.htm [https://perma.cc/4ZXP-7BWJ].

197. A. Dan Tarlock, *The Future of Prior Appropriation in the New West*, 41 NAT. RESOURCES J. 769, 770 (2001).

198. BRIAN GRAY ET AL., ALLOCATING CALIFORNIA'S WATER: DIRECTIONS FOR REFORM 7 (2015), https://www.ppic.org/content/pubs/report/R_1115BGR.pdf [https://perma.cc/2BP4-JP5Y]. There are "area of origin" restrictions in California which may be copied by other states. *Id.* These restrictions "allow individuals and communities to establish new rights for surface water in their local watersheds. These rights are senior to those of water users who export water from these areas." *Id.*

199. THOMPSON ET AL., *supra* note 78, at 303.

200. *Id.* at 307–312.

201. *Id.*

202. CASADO PÉREZ, *supra* note 3, at 147–48.

203. *Id.*, at 146–53; ADLER ET AL., *supra* note 22, at 156–57.

204. CASADO PÉREZ, *supra* note 3, at 147–48.

205. *Id.* at 87–89.

role,[206] particularly as large investment in water takes place. For example, WaterExchange, LLC, a company that offers transaction advice, water rights appraisal, and market information, worked with a customer to execute water transactions valued at $100 million in Arizona.[207]

In Australia, water markets have flourished after the entitlement reform that occurred in that country as a result of the Millennium drought.[208] For example, two companies have invested directly in water: Duxton Water Ltd.[209] and Webster, which holds agricultural stock.[210] Water is attractive because it is an asset likely to appreciate in the future as climate change strikes, and, because it is an asset mostly uncorrelated with other assets. Duxton holds entitlements to water just to lease them.[211] It is not unthinkable that the same could end up taking place in the United States because legislation ensures that leasing water is not against beneficial use. In fact, in order to promote water markets, states, such as California, have enacted provisions clarifying that leasing a water right is not the same as not using it.[212] Before this clarification, many irrigators were wary of entering into short or long term water transfers because they feared that water agencies would perceive trading as triggering the forfeiture provisions.[213] As such, there is no clear legislative impediment in water law in the Western United States to a company acquiring water rights and immediately putting them to beneficial use via a lease. It may be worth exploring the possibilities to patch this regulatory gap, or, soon, we may even find someone proudly calling himself a "water bandit," as David Williams, an Australian who has invested

206. *See, e.g.*, *About Us*, WESTWATER RES., LLC, http://www.waterexchange.com/about-us/ [https://perma.cc/X4VV-Q9D8].

207. *Company Principals*, WESTWATER RES., LLC, http://www.waterexchange.com/about-us/company-principals/ [https://perma.cc/99YC-TE4A] (description of Matt Payne, Principal).

208. *History of Australian Water Markets*, AUSTL. GOV. DEP'T OF AGRIC. (Nov. 4, 2019), https://www.agriculture.gov.au/water/markets/history [https://perma.cc/9Q4C-GRTU]; Jose Bolorinos, *Lessons Australia's Water Reform Offers in Science, Politics and Sustainable Watersheds*, STANFORD: WATER IN THE WEST (Aug. 21, 2019), https://waterinthewest.stanford.edu/news-events/news-insights/lessons-australias-water-reform-offers-science-politics-and-sustainable [https://perma.cc/X6MT-G8R5].

209. *About*, DUXTON WATER, http://www.duxtonwater.com.au (last visited Sept. 20, 2019).

210. *About Webster*, WEBSTER, http://www.websterltd.com.au (last visited Jan. 2, 2020).

211. Tim Boreham, *Dipping Into Water Stocks*, SHARECAFE (Sept. 19, 2018), https://www.sharecafe.com.au/2018/09/19/dipping-into-water-stocks/ [https://perma.cc/3J4C-V4TS].

212. CASADO PÉREZ, *supra* note 3, at 135–37.

213. *Id.* at 136–37.

in water rights and gets a capital gain of 20% annually does.[214] Up to 8% of the water rights in the Murray-Darling basin is owned by water investors.[215]

IV. NEGATIVE EFFECTS FROM THE FLOW OF MONEY INTO WATER MARKETS

Money flowing into the water industry, coupled with the now long-standing privatization of water utilities and the growing interest in the water itself, is setting off the alarms. The opposition to water markets is nothing new. Water markets may raise efficiency, but there is a high risk of non-internalized negative externalities and fairness concerns. While everyone, from time to time, pays to drink from a fancy non-reusable plastic water bottle which has traveled thousands of miles from the spring where it originated,[216] the commoditization of water is often criticized. Commodification is criticized because water is perceived as so essential and public that its allocation, to the extent possible, should not be subject to market mechanisms.[217] Even when water is subject to those traditional and heavily regulated market mechanisms, that is, water rights exchanges, the concern for the community of origin and for low-income populations are always present.[218] Markets are expected to increase water prices and make its allocation efficient, but they may also price out part of the population[219] and take water far away from its natural basin.[220] These critiques are even stronger today when big money is investing in every facet of the water market. Another recently enhanced fear is that fewer players will have

214. Adam Courtenay, *Water Rights, Trading and the New Water Barons*, IN BLACK (Nov. 1, 2017), https://www.intheblack.com/articles/2017/11/01/water-rights-barons [https://perma.cc/Z5JN-TUQ8].

215. *Id.*

216. Christine A. Klein, *Water Transfers: The Case Against Transbasin Diversions in the Eastern States*, 25 UCLA J. ENVTL. L. & POL'Y 249, 258 (2006).

217. Gleick et al., *supra* note 108, at 1. CULP ET AL., *supra* note 83, at 16. For a review of the normative debate, *see* Norman W. Spaulding III, *Commodification and Its Discontents: Environmentalism and the Promise of Market Incentives,* 16 STAN. ENVT'L. L. J. 293 (1997); *see also* Michael C. Blumm, *The Fallacies of Free Market Environmentalism,* 15 HARV. J. L. & PUB. POL'Y 371, 375 (1992).

218. Vanessa Casado Perez, *Whose Water? Corporatization of a Common Good*, *in* ENVTL. L. DISRUPTED (forthcoming Environmental Law Institute) (on file with the author); HANAK, *supra* note 93, at 4–6, 81 ("[S]tudies also demonstrate that there can be significant localized negative effects on individual farm workers and businesses and on local public agencies such as school districts. Thus, there may be ethical grounds for devising mitigation programs, even when a transfer does not trigger the legal requirement to do so. The case for mitigation is stronger when the transfer has negative distributional implications—a concentration of losses to low-income farm workers and processing plant laborers and accrual of most benefits to the relatively wealthy members of the community (or, in the case of absentee landlords, nonmembers).").

219. Gleick et al., *supra* note 108, at iv.

220. CULP ET AL., *supra* note 83, at 16.

the power to decide the fate of our water.[221] Furthermore, while the traditional exchange of water rights is subject to some restrictions and controls, new forms of investment in water are not considering negative externalities to third parties. They manage to exploit the gaps in the system. Either these transactions that happen in water markets broadly understood may not be subject to the same scrutiny than traditional water rights exchanges, or they benefit from gaps in the regulation. In addition, these new forms of investment bring other types of concerns, such as disgust at these companies for investing in water and benefiting from their own misconduct that contributes to climate change.

The following subsection starts with precisely this last concern, the moral wrong that companies, which contribute to climate change, commit when profiting from a thriving market thanks to water scarcity. Then, it moves to distributional concerns: the struggles of the low-income population to afford more expensive water and the potential concentration in water markets. Finally, it deals with those gaps in the regulatory system that permit some of the profitable exchanges in water markets: the poor regulation of groundwater and the regulation of water reuse. This Article closes by analyzing how some of the transactions skirt a central tenet of prior appropriation while formally complying with the regulations.

A. Profiting from One's Own Misconduct

The investment of energy companies, such as the defunct Enron through its subsidiary Azurix[222] or oil tycoons, in water as an asset in itself reminds us of *Riggs v. Palmer*, the New York case where a grandson was not allowed to inherit from his grandfather because he had murdered him.[223] Those who have profited from creating climate change should not be allowed to profit from the business opportunities that its negative consequences create.[224] A similar statement could be

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221. James Laughlin, *Water Market Continues Growth Despite Global Recession*, WATER WORLD (Dec. 1, 2009), https://www.waterworld.com/international/wastewater/article/16200533/water-market-continues-growth-despite-global-recession [https://perma.cc/G983-CSEB]; BARLOW & CLARKE, *supra* note 9, at 101–53.

222. *See generally* PUB. CITIZEN'S CRITICAL MASS ENERGY & ENV'T PROGRAM, LIQUID ASSETS: ENRON'S DIP INTO WATER BUSINESS HIGHLIGHTS PITFALLS OF PRIVATIZATION (2002), https://www.citizen.org/sites/default/files/liquidassets.pdf.

223. Riggs v. Palmer, 22 N.E. 188, 190 (N.Y. 1889). For commentary on *Riggs*, see generally RONALD DWORKIN, TAKING RIGHTS SERIOUSLY (1977).

224. The aim of this section is not to vilify oil companies. Some European oil companies stepped up their game around the Paris Climate Agreement and formed the Oil and Gas Climate Initiative (OGCI) pledging to reduce emissions and to explore new business models. Georg Kell, *Big Oil and Climate Leadership—An Oxymoron?*, FORBES (Sept. 18, 2018, 2:51 PM), https://www.forbes.com/sites/georgkell/2018/09/18/big-oil-and-climate-leadership-an-oxymoron/#4a2754fa624f.

made about those selling water to fracking companies at a high price. While the sellers themselves may not be engaging in major CO2 producing activities, they are benefiting from the climate change induced high water price when selling to the oil and gas industry,[225] which has contributed to greenhouse gases emissions and which outbids traditional water users.[226] While selling these companies water effluent[227] seems better, treated effluent is still the source of water of many users downstream of those cities, and, thus, it creates externalities.

The sale or lease of water rights by farmers has been frowned upon too. For years, they have received subsidized water that makes the desert bloom, and they have not been using that water efficiently.[228] While there have been advances in building some push toward efficiency in prior appropriation doctrines, such as the use of water duties,[229] there is still room for improvement. Markets allow them to profit from this past inefficient behavior funded by the taxpayers by selling water to urbanites.[230]

B. Community Externalities

Water markets may be expected to ensure that water ends up in the hands of those who value it more. This means, though, that the communities where that water comes from no longer have access to it and may not have access to the jobs that were making use of that water or to the economic activity depending on farming orders.[231] These

225. Maxx Chatsko, *1 Unexpected Stock that Could Cash in on the Permian Basin Oil Surge*, MOTLEY FOOL (Apr. 9, 2018, 6:02 AM), https://www.fool.com/investing/2018/04/09/1-unexpected-stock-that-could-cash-in-on-the-permi.aspx.

226. Russell Gold & Ana Campoy, *Oil's Growing Thirst for Water*, WALL STREET J. (Dec. 6, 2011), https://www.wsj.com/articles/SB10001424052970204528204577009930222847246.

227. Jennifer Hiller, *Companies Try Selling Effluent Water in the Eagle Ford,* SAN ANTONIO EXPRESS-NEWS (Mar. 9, 2013, 5:05 PM), https://www.mysanantonio.com/business/article/Companies-try-selling-effluent-water-in-the-Eagle-4342096.php.

228. CULP ET AL., *supra* note 83, at 10.

229. State Dep't of Ecology v. Grimes, 852 P.2d 1044, 1047 (Wash. 1993). In an adjudication, the referee curtailed the right the Grimes claimed based on historical usage by applying a water duty—an estimation of the amount of water needed for a particular crop—corrected by an efficiency factor. *Id.* The Court upheld the reduction. *Id.* at 1046–48. It stated that "the amount of water necessary for a beneficial use" will be limited to a reasonable amount for the particular purpose. *Id.* at 1049. A particular use must not only be of benefit to the appropriator, but it must also be a reasonable and economical use of the water in view of other present and future demands upon the source of supply. *Id.* For a commentary on *Grimes*, see David H. Getches, *Changing the River's Course: Western Water Policy Reform*, 26 ENVTL. L. 157, 161–63 (1996).

230. Passell, *supra* note 5, at 1–2.

231. The experience of Carson County is illustrative. Before the county's groundwater was exported there were new car-dealers and two farm-equipment providers. After the water

communities lose out on all of this without any decision-making power on their part.[232] An individual farmer or farm company selling water might not have communitarian preferences[233] and may only consider her own gain. This type of externality to the community is not exclusive to the transfer of water rights. Individual transfer quotas in fisheries also raised similar problems in ports where the economy is not diversified, and the quotas may translate into unemployment for the crews.[234]

A part of the scholarship rejects these community externalities—also labeled pecuniary externalities—because they believe that the effects on the economy and life of a region beyond the parties to a water transfer are no different from any other economic transaction with winners and losers.[235] In other words, for them, water being relocated is no different than a manufacturing plant relocating from the Rustbelt to China.

In practice, though, compensation for these community externalities has occurred in water transactions. Some scholars acknowledge the controversies regarding the definition of pecuniary externalities and accept that it is politically necessary to take them into account, but conceive of compensation in such cases as transitional, that is, funds allocated to mitigate these issues should be temporary in order to encourage efficient behavior.[236] A transitional remedy might train workers to shift to other business sectors in the area or take the form of general assistance measures directed to improving the economic tissue of the region.[237]

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was gone, the one farm-equipment provided struggle to make Joe Nick Patoski, *Boone Pickens Wants to Sell You His Water*, TEX. MONTHLY (Jan. 20, 2013), https://www.texasmonthly.com/the-culture/boone-pickens-wants-to-sell-you-his-water/. Now that the water is gone, there are no new car-dealers and the one remaining farm-equipment provider struggles to stay in business. *Id.*

232. *See generally* Thompson, *supra* note 38 (analyzing the California case for water markets and the interplay between government rules and traditional institutions which tend to be reluctant to transaction with external actors); *see also* GLEICK, *supra* note 108, at 39; *cf.* Kyle Emerick & Dean Lueck, *Economic Organization and the Lease-Ownership Decision in Water*, SSRN 25 (Jan. 31, 2010), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1605523.

233. *See generally* Thompson, *supra* note 38; *cf.* Emerick & Lueck, *supra* note 232, at 25.

234. Bonnie J. McCay et al., *Individual Transferable Quotas (ITQs) in Canadian and US Fisheries*, 28 OCEAN & COASTAL MGMT. 85, 94 (1995); EUGENE H. BUCK, CONG. RESEARCH SERV., 95–849 ENR, INDIVIDUAL TRANSFERABLE QUOTAS IN FISHERY MANAGEMENT 12 (1995).

235. Huffman, *Water Marketing*, *supra* note 36, at 432.

236. James J. Murphy et al., *Mechanisms for Addressing Third-Party Impacts Resulting from Voluntary Water Transfers*, *in* USING EXPERIMENTAL METHODS IN ENVIRONMENTAL AND RESOURCE ECONOMICS 91, 110 (J. List ed., 2005).

237. HANAK, *supra* note 93, at 88–94 (discussing the advantages of disadvantages of targeted versus general programs). Targeted programs will devote funds to compensate those

The harder effects on communities occur where sold water comes not from a more efficient use of the resource but from the idling of fields. Behind this difference is the idea that if transferred water comes from a more efficient use, it involves fewer consequences for other factors employed since production is not curtailed.[238] In contrast, fallowing may entail unemployment for farm workers (direct effects), fewer business transactions for farm suppliers (indirect effects), and broader effects on the rural communities in general (spillover effects).[239] All of these combined may produce a "multiplier effect."[240] Nonetheless, the first lands put to fallow can be expected to be the ones producing low-value added crops and, thus, these tend not to employ many other inputs.[241] A review of studies regarding the effects of fallowing between 6% and 25% of farmland in an area shows that such actions usually affect less than 1% of the economic activity of a region.[242] Despite this evidence, the Model Water Transfer Act for California suggested taking these costs into consideration when approving the transaction in the review[243] if the water sold comes from land fallowing. Given the harsher effects of fallowing and the heated response we may expect from communities, it should be considered whether public agencies should take this into account either in the review procedure or by establishing some ex-post mechanism.

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who are more directly affected, such as unemployed farm workers or farm suppliers. *Id.* at 90. Regarding the first, a claims-based system regarding cash compensation could be envisioned but high administrative costs and the political economy of the affected group disfavor it. *Id.* at 90–91. Other targeted programs include job search and training programs for laid-off workers. *Id.* at 90. "General assistance might take the form of measures to improve the economic environment of the area, for example, infrastructure investments or reduced sales taxes, or might support specific projects of benefit to area residents." *Id.*

238. *Id.* at 71–77 (local jurisdictions try to prevent transfers where the source of water is land fallowing because those have harsher effects on the economy. Where water comes from irrigation efficiency gains, other factors such as farm workers may remain employed because production is maintained).

239. *Id.* at 122–23.

240. *See id.* at 81–82 (reviewing several empirical studies on land fallowing arising from water transfers, other pilot or environmental programs or regulations, and simulations).

241. *See id.* at 124 (presenting the mitigating role that the mere economics on land fallowing have on the potential effects on communities).

242. *Id.* at 81.

243. The Model Water Transfer Act is a proposal to reform California's water law in order to promote market reallocation. It was drafted by academic and sponsored by, among others, the California Chamber of Commerce and the California Farm Bureau. Brian E. Gray, *A Model Water Transfer Act for California*, 4 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 591, 601–02 (2008). However, those defending the community dimension of water still found the efforts in the proposal insufficient. *See* Santos Gomez & Penn Loh, *Communities and Water Markets: A Review of the Model Water Transfer Act*, 14 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 689, 691, 707–08 (2008).

C. Pricing Out Low-Income Population

The negative effect of the market on water allocation for low-income populations is the strongest argument against water markets. Water is a human right, and, in economics parlance, it can be understood to be a merit good.[244] In legal parlance, many have categorized it as a human right.[245] A price increase affects those whose disposable income is lower.[246] Privatization, in many instances, has meant higher rates.[247] Higher water prices exacerbate other environmental injustices.[248] For example, in a market dominated by private actors, poor communities may not receive reliable water delivery, if water gets delivered at all.[249]

Privatization is not the only cause of increased prices; water rights markets have the same effect. These water rights markets are based on the worthy goal of prices reflecting the true value of water.[250] However, there is a new costly institutional framework composed of brokers and middlemen.[251] What is more, profits also end in the hands of water rights-holders who did not pay for their rights in the first place.[252]

D. Market Concentration

Beyond the moral opposition to any sort of private investment commodifying water, the role of big money in water seems troublesome to many.[253] There seems to be an implicit fear that a water market

244. C. J. PERRY ET AL., WATER AS AN ECONOMIC GOOD: A SOLUTION, OR A PROBLEM? 6 (Kingsley Kurukulasuriya ed., 1997), http://ageconsearch.umn.edu/bitstream/61113/2/REPORT14.pdf.

245. Erik B. Bluemel, *The Implications of Formulating a Human Right to Water*, 31 ECOLOGY L.Q. 957, 967–77 (2004); Peter H. Gleick, *The Human Right to Water*, 1 WATER POL'Y 487, 501 (1999).

246. ENVTL. JUSTICE COAL. FOR WATER, THIRSTY FOR JUSTICE: A PEOPLE'S BLUEPRINT FOR CALIFORNIA WATER 50 (2005), https://www.issuelab.org/resources/2885/2885.pdf.

247. SNITOW ET AL., *supra* note 123; Jennifer Davis, *Private-Sector Participation in the Water and Sanitation Sector*, 30 ANN. REV. ENV'T & RESOURCES 145, 166 (2005).

248. JOHN GIBLER, WATER FOR PEOPLE AND PLACE: MOVING BEYOND MARKETS IN CALIFORNIA WATER POLICY 4 (2005), https://www.citizen.org/sites/default/files/water-for-people_web.pdf.

249. FOOD & WATER WATCH, WATER=LIFE: HOW PRIVATIZATION UNDERMINES THE HUMAN RIGHT TO WATER 4 (2011), https://www.foodandwaterwatch.org/sites/default/files/Water%20Equals%20Life%20IB%20July%202011.pdf (reviewing the case-sturdy of Jakarta, Indonesia, where the private company supplying water prioritized extending the service to wealthier parts of town).

250. CULP ET AL., *supra* note 83, at 7.

251. Klein, *supra* note 216, at 259.

252. Ellen Hanak et al., *Myths of California Water–Implications and Reality*, 16 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 3, 21–22 (2010) (reviewing the view of farmers as water villains who overuse water because they are paying a subsidized price for it. Instead of ending the subsidies, the possibility of transferring water rights give the farmers the incentives to be efficient.).

253. BARLOW & CLARKE, *supra* note 9, at 101–53.

where large companies are investing is a water market with fewer actors.[254] The big multinational corporations, like Vivendi and Suez, which are labeled the General Motors and Ford companies of water,[255] will dominate. The concentration may trickle to other sectors too, among those, the agricultural one. However, it must be acknowledged that the concentration in related markets is not only the result of the new investment in water but also the long-coming changes in agriculture itself.[256] The agricultural sector is not just composed of Jeffersonian yeoman farmers. Agribusiness leads the way.[257]

Setting the related markets issue aside, the question that needs to be asked is: what is the harm that comes from having large holders of water rights? Antitrust will supposedly deal with the ripple effects of concentration in other markets.[258] If too few companies produced tomatoes, like some say happens in the case of bananas,[259] and there was no competition from other countries, we would expect the Department of Justice to take action. The same would be true if there was concentration in any natural resource market. However, in natural resources, regulations have tried to prevent the situation from arising in the first place by limiting the amount of a resource anyone or any company can possess.[260] The idea behind such a limit is to ensure that the all-mighty private sector cannot outpower the regulatory agency and that it is not able to put the nation in check by controlling certain key natural resources.[261]

Furthermore, questions may be raised not only because water is in the hands of a few, but because these few are foreigners. All over

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254. *Id.* 106–09.

255. *Id.*, at 85.

256. Shi-Ling Hsu, *Scale Economies, Scale Externalities: Hog Farming and the Changing American Agricultural Industry*, 94 OR. L. REV. 23, 23–24 (2015)

257. Melanie J. Wender, *Goodbye Family Farms and Hello Agribusiness: The Story of How Agricultural Policy Is Destroying the Family Farm and the Environment*, 22 VILL. ENVTL. L. J. 141, 141 (2011). The average farm size in 1940 was around 175 acres. U.S. DEP'T OF AGRIC., CENSUS OF AGRICULTURE: 1940, at 68 (1940), http://usda.mannlib.cornell.edu/usda/AgCensusImages/1940/03/02/1940-03-02.pdf. In 2018, the average was 443 acres. M. Shahbandeh, *Average Farm Size in the United States from 2000 to 2018 (in Acres)*, STATISTA (Aug. 9, 2019), https://www.statista.com/statistics/196106/average-size-of-farms-in-the-us-since-2000/. Another data point that can be useful is that farms with a single farmer represent 64% of the total family farms but only 51% of the production. *Id.*

258. *Competitive Effects*, FED. TRADE COMM'N, https://www.ftc.gov/tips-advice/competition-guidance/guide-antitrust-laws/mergers/competitive-effects (last visited Nov. 22, 2019) (the FTC analyzes market concentration when inquiring the competitive effects of a merger).

259. Eric Levenson, *Big Merger Creates the World's Largest Banana Company*, THE ATLANTIC (Mar. 10, 2014), https://www.theatlantic.com/business/archive/2014/03/big-merger-creates-worlds-largest-banana-company/359003/.

260. *See infra Section III.C.*

261. David G. Miller, *The Historical Development of Oil and Gas Laws in the United States,* 51 CALIF. L. REV. 506, 517–18 (1963).

the world, countries limit foreign private investment.[262] Often the reasons revolve around national security.[263] However, the definition of national security is far from homogeneous.[264] In some countries, like Canada, it even includes the idea of cultural policy.[265] Given the threats that water scarcity and water infrastructure pose to national security,[266] logically, investment in this area would be flagged because it affects critical infrastructure. Several countries recognize water infrastructure as key and discriminate against foreign investors in that area.[267] The United States is no exception. The Foreign Investment Risk Review Modernization Act (FIRRMA), passed in 2018, expanded which transactions were covered.[268] Among those covered are transactions involving foreign, non-passive investments in U.S. critical infrastructure.[269] Water infrastructure is certainly critical for U.S. national security.[270] Being covered means that the Committee on Foreign Investment in the United States (CFIUS)[271] will review the transactions and, where appropriate, impose certain changes or deal restructuration.[272] Furthermore, once the CFIUS concludes an investigation, the President could prohibit the investment, although he has almost never done so.[273] In any event, the potential concern

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262. U.S. GOV'T ACCOUNTABILITY OFF., GAO-08-320, FOREIGN INVESTMENT: LAWS AND POLICIES REGULATING FOREIGN INVESTMENT IN 10 COUNTRIES 3 (2008), https://www.gao.gov/new.items/d08320.pdf.

263. *Id.*

264. KATHRYN GORDON & MAEVE DION, PROTECTION OF 'CRITICAL INFRASTRUCTURE' AND THE ROLE OF INVESTMENT POLICIES RELATING TO NATIONAL SECURITY 4 tbl.1 (2008), http://www.oecd.org/daf/inv/investment-policy/40700392.pdf.

265. U.S. GOV'T ACCOUNTABILITY OFF., *supra* note 262, at 10.

266. HOMELAND SEC. COUNCIL, NATIONAL STRATEGY FOR HOMELAND SECURITY 27 (2007).

267. *See* GORDON & DION, *supra* note 264, at 7 (asserting that 18 out of 39 OECD countries surveyed have discriminatory policies in water and treatment systems).

268. H.R. 5515, 115th Cong. § 1702 (2018).

269. H.R. 5515, 115th Cong. § 1703(a)(5) (2018) ("(5) Critical infrastructure.—The term 'critical infrastructure' means, subject to regulations prescribed by the Committee, systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems or assets would have a debilitating impact on national security.").

270. Gunjan R. Talati, *CFIUS Reform Is Here: What the Foreign Investment Risk Review Modernization Act of 2018 Means for Your Transaction*, LEXOLOGY (Aug. 3, 2018), https://www.lexology.com/library/detail.aspx?g=a9797189-941b-4c0d-a8d6-e8c6a69fc53e; GORDON & DION, *supra* note 264, at 5 tbl.2.

271. Its composition reflects the concerns being targeted. It is composed of: (1) The Secretary of the Treasury, (2) The Secretary of Homeland Security, (3) The Secretary of Commerce, (4) The Secretary of Defense, (5) The Secretary of State, (6) The Attorney General of the United States, and (7) The Secretary of Energy. 50 U.S.C. app. § 2170(k)(2) (2008).

272. *Overview of the CFIUS Process*, LATHAM & WATKINS LLP (2017), https://www.lw.com/thoughtLeadership/overview-CFIUS-process.

273. David Zaring, *CFIUS as a Congressional Notification Service*, 83 S. CAL. L. REV. 81, 87 (2009).

about the foreign origin of the private investment should be somewhat reduced. However, the worry by plenty of those who are against water commodification is not necessarily the security threat but the potential harm to consumers and, to an extent, to cultural values that define water as a commons.[274] As such, their concern could be better captured by regulations recognizing cultural concerns as a reason to discriminate against foreign investment.[275]

E. Exploiting Regulatory Gaps

1. Groundwater

Not all states regulate groundwater and surface water jointly, although they are more often than not interconnected.[276] Groundwater is still ground zero for the tragedy of the commons in many states.[277] There are a myriad of reasons for the duality in water regulation. Among them is that initially there was not much knowledge about how groundwater operated.[278] Today, the situation is probably explained by path dependence and the difficulty of regulating entrenched interests.[279] Investing in a less regulated resource, groundwater, is an interesting prospect in times of water scarcity.[280] Furthermore, new investment in water is keen on exploiting these regulatory gaps.[281]

California, often a leader in environmental matters, did not have much of a groundwater regulation until the last drought crisis, when,

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274. BARLOW & CLARKE, *supra* note 9, at 87.

275. U.S. GOV'T ACCOUNTABILITY OFF., *supra* note 262, at 8.

276. THOMPSON ET AL., *supra* note 78, at 444–45. They are less connected in cases of confined aquifers like the Ogallala. Burke W. Griggs, *General Stream Adjudications as a Property and Regulatory Model for Addressing the Depletion of the Ogallala Aquifer*, 15 WYO. L. REV. 413, 417 (2015).

277. Richard Frank, *Tragedy of the Commons–California Drought-Style*, LEGAL PLANET (July 13, 2015), http://legal-planet.org/2015/07/13/tragedy-of-the-commons-california-drought-style/.

278. THOMPSON ET AL., *supra* note 78, at 444.

279. Dave Owen, *Taking Groundwater*, 91 WASH. U. L. REV. 253, 256-58 (2013) (explaining how groundwater regulation responds to the situation before current times and how takings doctrine may disincentive states to regulate existing rights); Robert G. Varady et al., *Groundwater Policy and Governance*, *in* 5 GROUNDWATER GOVERNANCE: 14 (2013), https://wrrc.arizona.edu/sites/wrrc.arizona.edu/files/pdfs/GWG_ThematicPaper5_20APr2013_web.pdf (table analyzing the political economy of groundwater governance); John Ferejohn, *California's Groundwater: A Political Economy* (working paper), https://ostromworkshop.indiana.edu/pdf/seriespapers/2017spr-colloq/ferejohn-paper.pdf (2017).

280. *See* Ryan Sabalow & Phillip Reese, *You Could Fill Shasta Lake 7 Times with Farm Groundwater Lost During State Drought*, SACRAMENTO BEE (May 17, 2017, 1:51 PM), https://www.sacbee.com/news/state/california/water-and-drought/article151099812.html; *see also* Dean Baxtresser, Note, *Antiques Roadshow: The Common Law and the Coming Age of Groundwater Marketing*, 108 MICH. L. REV. 773, 776 (2010).

281. Noah Gallagher Shannon, *The Water Wars of Arizona,* N.Y. TIMES (July 19, 2018), https://www.nytimes.com/2018/07/19/magazine/the-water-wars-of-arizona.html.

finally, the California legislature managed to pass the Sustainable Groundwater Management Act, which delegates the effective regulation of groundwater to new-formed local agencies.[282] In Texas, the rule of capture applies to groundwater.[283] Hence, it gives landowners the right to pump water below their property—as much of it as they want.[284] Still, in other states, while groundwater is subject to rules like reasonable use (American rule) or correlative rights, it is not subject to a regime as thorough as surface water.[285] Some states like Alabama do not follow the New Mexico or Hawaii[286] example of integrating surface and groundwater and requiring permits for the latter.[287] Alabama applies a reasonable use for groundwater (or correlative rights)[288] but does require a permit for surface water.[289]

Due to the aforementioned lack of regulation in both Texas and California, there have been discussions about the power of local authorities, be it counties for California or groundwater management districts in Texas, to prevent the exportation of groundwater beyond the jurisdiction where it is pumped from. In California, county legislation preventing exports has a long history.[290] In Texas, groundwater management districts may set the same restrictions for both users within the jurisdiction and those who export to ensure the sustainability of the resource. These districts may impose export

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282. *SGMA Groundwater Management*, CAL. DEP'T OF WATER RES., https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management (last visited Nov. 23, 2019).

283. Hous. & Tex. Cent. R.R. Co. v. East, 81 S.W. 279, 280 (Tex. 1904); AMY HARDBERGER, TEXAS GROUNDWATER MARKETS AND THE EDWARDS AQUIFER 3 (2016), https://static1.squarespace.com/static/56d1e36d59827e6585c0b336/t/5805468415d5dbb1ab59a3a9/1476740751543/Texas-Groundwater-Markets-Hardberger.pdf.

284. *Texas Water Law*, TEX. A&M UNIV., https://texaswater.tamu.edu/water-law (last visited Nov. 23, 2019).

285. Joseph W. Dellapenna, *Legal Classifications*, *in* 2 WATERS AND WATER RIGHTS § 19.05 (Amy K. Keller ed., 2011) (describing groundwater legislation as "highly fragmentary" and "piecemeal"); *see also* Rebecca Nelson and Philippe Quevauviller, *Groundwater Law*, *in* INTEGRATED GROUNDWATER MANAGEMENT 173, 174 (Anthony J. Jakeman et al., eds., 2016).

286. HAW. REV. STAT. § 174C-2(c) (1993).

287. Robert Haskell Abrams, *Legal Convergence of East and West in Contemporary American Water Law*, 42 ENVTL. L. 65, 73 (2012).

288. RACHAEL LOUISE CAIN ET AL., GROUNDWATER LAWS AND REGULATIONS: A PRELIMINARY SURVEY OF THIRTEEN U.S. STATES 8 (Gabriel Eckstein & Amy Hardberger eds., 2017), https://law.tamu.edu/docs/default-source/faculty-documents/groundwater-laws-reg-13states.pdf?sfvrsn=0.

289. DON R. CHRISTY ET AL., A COMPARISON OF SURFACE WATER LAWS AND REGULATIONS FROM SOUTHEASTERN STATES 7 (2005), https://athenaeum.libs.uga.edu/bitstream/handle/10724/19397/surfacewater.pdf?sequence=1.

290. Gregory S. Weber, *Twenty Years of Local Groundwater Export Legislation in California: Lessons from a Patchwork Quilt*, 34 NAT. RESOURCES J. 657, 663 (1994); ELLEN HANAK & ELIZABETH STRYJEWSKI, CALIFORNIA'S WATER MARKET, BY THE NUMBERS: UPDATE 2012, at 16 (2012), https://www.ppic.org/content/pubs/report/R_1112EHR.pdf.

fees, but an outright ban is not possible because they need to treat exporters and those using water within the jurisdiction equally.[291]

While the situation is particularly problematic in states like California or Texas, groundwater laws are in general out-of-date and not suited to respond to the challenges that water marketing poses.[292] A full-fledged regulation of water markets, including surface and groundwater, would be the ideal way forward. Markets in water rights can help water to flow to those who value it the most, encourage those who can sell water to be efficient in their water use, and, make expansions in supply through costly infrastructure less necessary.[293]

It should be noted that water is always exported because it is embedded in any product produced.[294] This concept is encapsulated in the water footprint. For example, your average eight ounce glass of milk requires more than sixty-seven gallons of water on average.[295] If milk does not come from cows grazing in grasslands belonging to the same watershed where the milk is consumed, an export of water occurs every morning someone drinks milk. This Article has set aside the even broader concept of a water market that would account for these implicit water exports. However, they do play a role in shaping views on water allocation and markets. For example, when water runs low in California, critics of those producing alfalfa which ends up in China abound.[296]

2. Water Reuse

Water reuse is not necessarily a win-win situation where supply increases and pollution in our waterways decreases. Before starting to reuse the water, cities treated their effluent and discharged it into the river.[297] Many of our rivers are overallocated, and thus, downstream

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291. LESIKAR ET AL., *supra* note 186.

292. *See* Baxtresser, *supra* note 280. Despite the push for groundwater markets, current laws are ill suited to deal with the shift toward markets deciding who is the high-value user. *Id.* "Under these laws, the legality of marketing often rests upon an antiquated, and now-arbitrary, legal distinction of whether a given doctrine permits off-tract use." *Id.* Instead of relying on out-of-date laws, states should actively regulate groundwater marketing. *Id.*

293. Henning Bjornlund & Jennifer McKay, *Aspects of Water Markets for Developing Countries: Experiences from Australia, Chile and the U.S.*, 7 ENV'T & DEV. ECON. 767, 769 (2002).

294. *Virtual Water Trade*, WATER FOOTPRINT NETWORK, https://waterfootprint.org/en/water-footprint/national-water-footprint/virtual-water-trade/ (last visited Nov. 20, 2019).

295. *Product Gallery: Milk*, WATER FOOTPRINT NETWORK, https://waterfootprint.org/en/resources/interactive-tools/product-gallery/ (last visited Sept. 20, 2019).

296. Alastair Leithead, *California Drought: Why Farmers Are 'Exporting Water' to China*, BBC NEWS (Feb. 19, 2014), https://www.bbc.com/news/magazine-26124989.

297. NAT. RESEARCH COUNCIL, UNDERSTANDING WATER REUSE: POTENTIAL FOR EXPANDING THE NATION'S WATER SUPPLY THROUGH REUSE OF MUNICIPAL WASTEWATER 5 (2012).

users are likely to be relying on these return-flows for decades.[298] By reusing the water, the city may be benefiting either by using it to satisfy its growing demand or by selling it. Right holders who divert water and put it to beneficial use in a prior appropriation state own the return flow.[299] As such, they can decide to discontinue it and use it within the parameters of their right no matter the negative effects on third parties, and, perhaps, the reduction of the overall social utility. There is no guarantee that water re-used by the city would create more added value than the same water in the form of return flow being used by downstream users.[300]

3. Going Against the Core of Prior Appropriation

The enhanced commodification of water that we are experiencing these days seems to run afoul of the very essence of water as public property. Many states declare in their constitutions that water is owned by the people of the state.[301] To put that water to use, we allocate water rights over it. Those who obtain those water rights usually do it for free or by paying limited fees.[302] Any commercial transfer of water can be described as a "windfall" profit for those who sell it, be it water itself or their limited right to use water. Thus, allowing the commodification to be described as a giveaway of public resources.[303] Public policy reasons to allow this are that reallocation will put water to a more efficient use, and a higher price discourages wasteful use of water.[304] However, while transfers of water are part of prior appropriation, speculation is not.[305]

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298. DAVID H. GETCHES, WATER LAW IN A NUTSHELL 155 (2009); Krista Koehl, *Partial Forfeiture of Water Rights: Oregon Compromises Traditional Principles to Achieve Flexibility*, 28 ENVTL. L. 1137, 1159–60 (1998). For a general description of what happens when return flows are reduced, see Casado Pérez, *supra* note 35.

299. *See supra* note 35.

300. Casado Perez, *supra* note 35, at 11047 (explaining how modifications in the return flow may decrease the overall efficiency of the system using the shift from flood irrigation to drip irrigation which decreases the amount of return flow that reaches other users down the stream in the same way that water recycling does for users downstream of a city). The analysis must be done case by case.

301. Frank J. Trelease, *Government Ownership and Trusteeship of Water*, 45 CALIF. L. REV. 638, 639 (1957); *see, e.g.*, COLO. CONST. art. XVI, § 5; WYO. CONST. art. 8, § 1.

302. For example, in California, water rights obtained pre-1914 do not require a permit. *Frequently Asked Questions*, CAL. STATE WATER RES. CONTROL BD., https://www.waterboards.ca.gov/waterrights/board_info/faqs.html#toc178761091 (last visited Nov. 22, 2019). Also, in California, a holder of post-1914 prior appropriation rights must pay both an application fee and an annual fee. The latter amounts to the greater of $100 or $0.03 per acre-foot. *Water Permit Schedule of Fees*, CAL. STATE WATER RES. CONTROL BD., https://www.waterboards.ca.gov/waterrights/water_issues/programs/fees/docs/fee_schedule_summary.pdf (last visited Nov. 20, 2019).

303. ITQs have also been described this way. McCay et al., *supra* note 234, at 96–97.

304. CULP ET AL., *supra* note 83, at 14.

305. Zellmer, *supra* note 4, at 1004.

Prior appropriation has a central tenet: water has to be put to a beneficial use.[306] This idea is embodied in two rules: the beneficial use requirement and the use-it-or-lose-it doctrine. If a water right holder does not use their water beneficially for a certain period, usually around five years, they may lose the water right. [307] So unlike with real estate or stocks and bonds, where owners can wait for the market to peak and then sell their assets, in water markets, owners cannot engage in this kind of wait-and-see.[308] Prior appropriation aims at encouraging productive, rather than speculative investment.[309]That said, if water becomes valuable enough, as it has become nowadays, investors may find a way around these rules. One company, Water Asset Management, is taking that route—considering land an accessory.[310] The company focuses on water itself, but to get to it, buys land and tries to make use of the land even if it is not their main goal.[311] This is not such a new endeavor. The Bass Brothers, Texan oil moguls, bought a "$60 million investment in rights to irrigation water largely in the Imperial Valley in California."[312] In 1999, their company, Western Farms and Cattle Company, exchanged the land and water rights for "$250 million worth of stock in the United States Filter Corporation, the world's largest seller of water treatment equipment."[313] United States Filter Corporation, soon to be a subsidiary of the global water company Vivendi and now belonging to Siemens, is pursuing the same endeavor as the Bass brothers did initially.[314] In addition to the Golden State deal, the company sought a similar deal in Nevada by buying a ranch and water north of Reno.[315]

At least in the case of surface water, there are some restrictions in place that make engaging in speculation more onerous. In groundwater, speculation is easier. Setting aside restrictions against the exportation of groundwater covered in Section V.A., groundwater is ripe for speculation. For example, one of California's largest farming corporations, Cadiz Inc., wanted to sell 47 trillion U.S. gallons of water from

306. GETCHES ET AL., *supra* note 192, at 90; THOMPSON ET AL., *supra* note 78, at 259–60.

307. Zellmer, *supra* note 4, at 1004. THOMPSON ET AL., *supra* note 78, at 356.

308. THOMPSON ET AL., *supra* note 78, at 253–54.

309. Zellmer, *supra* note 4, at 1007–08.

310. Lustgarten & ProPublica, *supra* note 6.

311. *Id.*

312. Janet Neuman, *Beneficial Use, Waste, and Forfeiture: The Inefficient Search for Efficiency in Western Water Use*, 28 ENVTL. L. 919, 968 n.354 (1998); Passell, *supra* note 5.

313. Passell, *supra* note 5. Since 2004 the company is a subsidiary of Siemenes. Matthew Karnitschnig & Taska Manzaroli, *Siemens to Buy Veolia Water Unit For $1 Billion*, WALL STREET J. (May 13, 2004), https://www.wsj.com/articles/SB108434300038209065; Neuman, *supra* note 312, at 968 n.354.

314. Peter Passell, *A Gush of Profits From Water Sale?*, N.Y. TIMES (Apr. 23, 1998), https://www.nytimes.com/1998/04/23/business/a-gush-of-profits-from-water-sale.html.

315. BARLOW & CLARKE, *supra* note 9, at 94.

municipalities in Southern California.[316] Cadiz Inc. is thought of as an agricultural business, but some see it as a natural resources company that wants to make a profit out of blue gold.[317] While water infrastructure may be a daunting challenge, as the somewhat failed deal made by T. Boone Pickens illustrates,[318] it is not an impossible obstacle to surmount. Cadiz Inc. managed to get the approval of the pipeline by the Trump administration and clear the environmental review process imposed by the California Environmental Quality Act.[319] However, many still think that the transfer of water outside the desert and depletion of the Fenner Valley Groundwater Basin would have effects on Joshua Tree National Park and the Mojave Trails National Monument that somehow had been unaccounted for in the pipeline's review.[320] This was expressed in a bill that the California legislature did not manage to pass this past summer.[321] Given that groundwater is subject to a separate property regime than surface water and that California's Sustainable Groundwater Management Act is not yet fully effective, the only control the state could have had related to the environmental effects of the infrastructure.

V. POTENTIAL REFORMS

A. Impact on Communities

The nested nature of the water management administration has opened avenues for communities impacted by water transfers to have their voice heard. In some cases, these communities where transferred water originates have veto power.[322] Lower administrative levels, such as counties in the United States,[323] have exercised their power to prohibit the transfer of water that originates from fallowing, even at the cost of preventing transactions otherwise beneficial.[324] This may reflect a parochial view of public interest. Such

316. *Id.*

317. Julia Sizek, *The Trouble with Cadiz*, MOJAVE PROJECT, http://mojaveproject.org/dispatches-item/the-trouble-with-cadiz/ (last visited Feb. 15, 2018).

318. *See supra* pp. 15 and notes 99–103.

319. *Milestones,* CADIZ, https://www.cadizinc.com/milestones/ (last visited Jan. 3, 2020).

320. Don't Drain Our Desert Water, NAT. PARKS CONSERVATION ASSOC., https://www.npca.org/advocacy/70-don-t-drain-our-desert-water (last visited Nov. 20, 2019).

321. James & Wyloge, *supra* note 143 (citing S.B. 120, 2017-2018 Leg. (Cal. 2017)).

322. Casado Perez, *supra* note 218.

323. HANAK, *supra* note 94 at 25–68, app. C. In chapters 3 through 5, Hanak sets out the current practices of counties. These are the basis for the empirical study of Appendix C where the variables that explain why a county adopts export restrictions are tested. *Id.*; Thompson, *supra* note 38, at 724–26 (describing the institutional obstacles to interregional trade posed by Californian mutual and water districts).

324. HANAK, *supra* note 93, at 73. Imperial Irrigation District had, as some other local agencies, a policy disallowing fallowing as a source for water transfers.

extreme measures should not be allowed if a market is to function properly, but the community concerns cannot be simply ignored.

Restricting, albeit not prohibiting, transactions outside a jurisdiction is another mechanism to address community concerns regarding origin, in water[325] and in other resources.[326] It can be interpreted as protection of community life, but a justification based on the environmental impact in the basin could also be offered. Victoria in Australia imposed a 4% cap on trade beyond the irrigation district, that is, on the volume of water entitlements that can be traded permanently out of an irrigation district.[327] Therefore, fewer workers will lose their jobs or need to find a job in another sector. These caps are similar solutions to the limits on the amount transferrable imposed for environmental reasons,[328] in part because neither the environment nor communities have clear right-holders who can defend their interests given the organizational problems of atomized groups. An alternative way to achieve a similar result is by reducing transferability and allowing only certain right-holders to trade with certain other defined right-holders. This is how some ITQ frameworks have achieved it.[329]

Beyond caps, there have been instances of monetary compensation by taxing transactions. In Butte County, California, around 2001, a fee (5%, which amounted to $3.75 per acre-foot) was established to compensate for the community loses.[330] In other cases, a lump-sum was assigned to tackle the revitalization of the community. One of the largest and more important transactions, the one agreed

325. *See generally* BARLOW & CLARKE, *supra* note 9, at 89.

326. BUCK, *supra* note 234, at 6.

327. There is a cap exchange rate that is not fulfilled by the individuals but by the state with its own entitlements to further mitigate potential effects. Hence, even if the buyer in Victoria will receive 0.9 m3, 0.09 more will be left in the river (10% of 0.9 is 0.09) by the State from its own endowment. Hence, the water that is actually left in the river is 0.19, more quantity than before in aggregate, even though the flow between upstream and downstream will be reduced. Waye & Son, *supra* note 49, at 444. For an account on the inefficiency arising from the cap, see *id.* at 444–45.

328. Murphy et al., *supra* note 236, at 92.

329. BUCK, *supra* note 234, at 4.

330. HANAK, *supra* note 93, at 73.

to in 2002 between the Imperial Irrigation District and San Diego, contained a clause establishing $20 million to mitigate third party economic effects.[331]

There are mechanisms which are not exactly caps, but which impose practical barriers to transferring water over a certain amount out of the jurisdiction. For example, Section 1745.05 of the California Water Code established a threshold of 20% of the total water supply coming from fallowed fields in a given year to trigger a public hearing.[332] The same idea underlies the legislative approval requirement in Oregon for water transfers out of the state,[333] which obviously implies very high transaction costs and which seems politically guided more than technically guided. The California Water Code's provision or the Oregon requirement are examples of ensuring a right to participation in water governance.[334]

Adapting these cap or fee mechanisms to the challenges that new investments in water pose is not an easy task because transactions are taking very different forms, and the decision-making power over the water is now further and further away from the community.

B. Vouchers, Tiered Pricing: How to Provide Water for Our Basic Needs

The amount of water that we need for our most essential needs is a small percentage of the overall water market.[335] International organizations, countries, and even a state in the United States, have framed the essential need of water as a human right.[336] The proposals on how

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331. Richard Howitt & Ellen Hanak, *Incremental Water Market Development: The California Water Sector 1985–2004*, 30 CAN. WATER RESOURCES J. 73, 78–79 (2005).

332. CAL. WATER CODE § 1745.05 (2020).

333. OR. REV. STAT. §§537.830, .801–.810 (2009).

334. For an account of a right to participate in water governance, see Larson, *supra* note 117, at 2236–66. Larson conceives the right to participation in water governance as a better embodiment of the human right to water than a right to the provision of water. *Id.* The latter implies significant shortcomings in terms of economic and environmental sustainability that the right to participation does not share. His definition of the right of participation in water has much in common with negative rights. *See id.* However, some of the tenets he argues the right of participation, as he conceives it, have plenty in common with the rights of communities in this paper. *See id.* He describes these participation mechanisms as follows: "Empowering disadvantaged communities and establishing procedural safeguards will facilitate fair and broad stakeholder participation in water--policy development and mitigate the effect of government corruption on sustainable and equitable water policy." *Id.* at 2203.

335. Glennon, *supra* note 38, at 1896. For other assertions that the amount needed to cover basic needs is a tiny fraction of the total, see Vanessa Casado-Pérez, *Go with the Flow: Lessons from Water Management and Water Markets*, *in* GOVERNING ESSENTIAL RESOURCES IN ACTION 237, 241 (2016); *see also* Thompson, *supra* note 45, at 38.

336 *Id.* at 2204. While the human right to water is not explicitly recognized in the Universal Declaration of Human Rights or the International Covenant on Economic, Social, and Cultural Rights, it is implicitly recognized in article 25 of the Universal Declaration (the right

to materialize that human right take different forms, but, more often than not, they configure it as a positive right. Positive rights require governmental action. In the case of a human right to water, each person has a right to receive a certain amount of water, and the government has a duty to provide it.[337] Another way to conceptualize this type of human right to water is as a right of provision.[338]

Within this paradigm of the right to water as a right to receive a certain amount of water, it is conceivable to allocate that percentage of our water that would cover basic needs based on principles other than market ones. The market could allocate the rest of the water based on economic efficiency principles.[339] In Australia's Murray Darling Basin, the authorities excluded 65% of the water from the market, not based on human rights but based on environmental concerns.[340] Even with this exclusion, Australian water markets are praised as the example to follow in the dry American West.[341]

The special nature of water is reflected in the tiered pricing that many jurisdictions have adopted to price household water,[342] and that if implemented, could mitigate this access concern. For almost any good, the more you buy, the cheaper it is per unit. In water, where tiered pricing is adopted, the first liters of water are relatively cheap, but if you want more of it, it steeply becomes more expensive.[343] This

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to a standard of living adequate for the health and well-being of himself and of his family) and articles 11 and 12 of the Covenant (the rights to an adequate standard of living and health). *Id.* at 2206-07 (citing GA Res 217 (III) A, Universal Declaration of Human Rights (Dec. 10, 1948); GA Res 2200 (XXI) A, International Covenant on Economic, Social, and Cultural Rights (Jan. 3, 1976)). In addition, the United Nations General Assembly passed a resolution in 2010 recognizing the right to water. 124 countries voted in favor but 41 nations abstained. According to Larson, the abstentions are due to the uncertainty on how to implement the human right to water given its configuration as a positive or provision right. Larson*, supra* note 117, at 2184 (citing G.A. Res. 64/292 ¶¶ 5, 8 (July 28, 2010); *see supra* notes 195–198; Bluemel, *supra* note 245, at 997.

337. Larson, *supra* note 117, at 2185–87.

338. *Id.* at 2204.

339. This bifurcation between water allocated by non-market mechanisms and market ones is explained in Victor B. Flatt, *Let Us Drink Our Fill: The History of Water and Its Impact on Resource and Environmental Management,* 18 YALE J.L. & HUMAN. (2006).

340. Courtenay, *supra* note 214.

341. *See* Robert David Pilz, *Lessons in Water Policy Innovation from the World's Driest Inhabited Continent: Using Water Allocation Plans and Water Markets to Manage Water Scarcity*, 14 U. DENV. WATER L. REV. 97, 115-16 (2010); Laura Taylor, *Drought Down Under and Lessons in Water Policy for the Golden State*, 40 ENVIRONS 53, 71 (2016); WILL FARGHER, RESPONDING TO SCARCITY: LESSONS FROM AUSTRALIAN WATER MARKETS IN SUPPORTING AGRICULTURAL PRODUCTIVITY DURING DROUGHT, https://www.oecd.org/tad/sustainable-agriculture/49192129.pdf.

342. ELLEN HANAK ET AL., PAYING FOR WATER IN CALIFORNIA 29 (2014), https://www.ppic.org/publication/paying-for-water-in-california/.

343. Interview by Janny Choy with Frank Wolak, Economics Professor, Stanford University (Apr. 24, 2015), https://waterinthewest.stanford.edu/news-events/news-press-releases/pricing-water-conservation-using-tiered-water-rates-structures-qa.

protects those consuming just to cover their most basic needs, while, at the same time, discouraging large water users who put a strain on scarce water resources.[344] Tiered pricing still has some problems because, in many jurisdictions, it can only be implemented if it reflects the cost of service and discouraging over-consumption may not be allowed.[345] Still, for the purposes of ensuring that those with less income pay less, this is no obstacle.

Tiered pricing, to the extent that it is not means-tested as it has not been in its current implementation, will cross-subsidize the necessary water for all, rich and poor. If a more targeted scheme is preferred, vouchers may be the best avenue. The Portland Water Bureau offers households enrolled in its Low-Income Utility Assistance Program one $150 crisis voucher every 12 months to cover their water bills. The customer must pay a portion of the bill to receive assistance.[346] Chile also has a full-fledged, means-tested subsidy program.[347] This subsidy was established in 1989 by Act to pay for potable water consumption and sewerage service of the waste waters.[348] Individual households need to apply for it through the municipality, but it is funded by the central government.[349] The subsidy takes into account the income of the families and the level of the tariffs, so it varies by region.[350] The subsidy only covers the first fifteen cubic meters per month, above

344. Adam Soliman & Henry McCann, *The "Inexact Science" of Water Pricing*, PUBL. POL'Y INST. CAL. (July 15, 2015), https://www.ppic.org/blog/the-inexact-science-of-water-pricing/.

345. This is the case of California where Proposition 218 (1996) established that municipalities cannot charge more than the cost for providing a service. Accordingly, tiered pricing of heavy users cannot be justified to enhance conservation. The cost of service limitation may impose some barriers to the use of tiered pricing based on income or pricing water used for basic needs cheaper. For an account on California, see Dale Kasler, *California Supreme Court Won't Budge on Water Rates*, SACRAMENTO BEE (July 23, 2015, 10:42 AM), https://www.sacbee.com/news/california/water-and-drought/article28414762.html#storylink=cpy.

346. U.S. ENVTL. PROT. AGENCY, DRINKING WATER AND WASTEWATER UTILITY CUSTOMER ASSISTANCE PROGRAMS 12 (2016), https://www.epa.gov/sites/production/files/2016-04/documents/dw-ww_utilities_cap_combined_508.pdf. This is not the only program that the Portland Water Bureau has; it "also offers a Safety Net Program that provides assistance to residential ratepayers facing a qualifying emergency (such as change in employment, unreimbursed medical bills, or divorce). The Safety Net Program can delay service disconnection, waive delinquency charges, offer interest-free payment plans, and include financial assistance. The duration of temporary assistance is established on a case-by-case basis." *Id.*

347. For an academic commentary, see ANDRÉS GÓMEZ-LOBO, INCENTIVE-BASED SUBSIDIES: DESIGNING OUTPUT-BASED SUBSIDIES FOR WATER CONSUMPTION (2001), https://openknowledge.worldbank.org/bitstream/handle/10986/11380/multi0page.pdf?sequence=1&isAllowed=y. *See also* Andrés Gómez-Lobo & Dante Contreras, *Water Subsidy Policies: A Comparison of the Chilean and Colombian Schemes*, 17 WORLD BANK ECON. REV. 391 (2003).

348. Law No. 18778 art. 1, Enero 17, 1989, DIARIO OFICIAL [D.O.] (Chile).

349. Gómez-Lobo & Contreras, *supra* note 347, at 394.

350. *Id.*

that, the household must pay the full price.[351] For those fifteen cubic meters the subsidy covers between 25% to 85% of the fix and variable costs.[352] For families in extreme poverty, the level of the subsidy is 100% for the first fifteen cubic meters.[353]

The different options to close the affordability gap can also be seen as a way to fulfill the human right to water or the right to water guaranteed in many constitutions as a provision right, the right to receive a certain amount of clean water.[354]

C. Closing the Regulatory Gaps

1. Joint Management of Surface and Groundwater

First, even before tackling the connection between surface and groundwater, groundwater needs to be regulated to avoid overexploitation. Otherwise, an aquifer is the paramount example of a site for a tragedy of the commons.[355]

But beyond the regulation of groundwater itself, when groundwater and surface water are connected, the need to manage groundwater and surface water jointly has long been ascertained. In 1973, the National Water Commission, in its final report, "Water Policies for the Future," included the need for integrated management of surface and groundwater.[356] The literature is abundant on this issue.[357] Under conjunctive management, "surface water and aboveground storage facilities are operated together with groundwater supplies and underground storage as components of a single system (*i.e.*, operated 'conjunctively'). Multiple water needs are met by shifting mixes of surface and groundwater supplies determined by their relative availability."[358] Conjunctive management can occur in some instances even when there is not an institutional framework that oversees surface and

351. *Id.*

352. *Id.* at 394 n.7

353. Law No. 19949 art. 8, Mayo 17, 2004, DIARIO OFICIAL [D.O.] (Chile).

354. Larson, *supra* note 117, at 2187.

355. Garrett Hardin, *The Tragedy of the Commons*, 162 SCI. 1243, 1244 (1968).

356. NAT'L WATER COMM'N, WATER POLICIES FOR THE FUTURE 232 (1973).

357. *See, e.g.*, William Blomquist et al., *Institutions and Conjunctive Water Management Among Three Western States*, 41 NAT. RESOURCES J. 653, 653 (2001); Frank J. Trelease, *Conjunctive Use of Groundwater and Surface Water,* 27 ROCKY MTN. MIN. L. INST. 12 (1982); Joseph L. Sax, *We Don't Do Groundwater: A Morsel of California Legal History*, 6 U. DENV. WATER L. REV. 269, 270 (2003) (discussing and critiquing California law); Hanak et al., *supra* note 53–57 (2010) (one of the analyzed "legal myths" in California is the idea that groundwater and surface water are two distinct resources).

358. Blomquist et al., *supra* note 357, at 655.

groundwater jointly.[359] But without such a system, which usually takes the form of a permit system, conjunctive management is much more expensive and difficult to implement.[360] Colorado is a good example to follow. Since the 1950s and 1960s the connection between surface water and groundwater has been blatantly clear in the South Platte basin.[361] If individuals start pumping groundwater, senior surface water users cannot receive water. In order to protect senior water right holders, conjunctive management was a must.[362] The Colorado legislature brought all surface and groundwater within a watershed under the prior appropriation system.[363] This means that older senior water users, which will inevitably be surface water users, will always have priority.[364] This may perpetuate older, less productive uses of water if there is no mechanism to push them toward efficiency. Either regulation or market incentives are ways to attenuate this path-dependence problem. Conjunctive management with a single permit system over surface and groundwater should close the gaps exploited by current water users and new investors.

2. Return Flow and Recycled Water

Any right holder can use the return flow within the parameters of its right.[365] In other words, a right holder who was producing return flow and returning it to the river can decide to consume the return flow in its same land for the same use. However, if the right holder wants to use it in other areas—like a city wanting to use it in a newly incorporated area—or sell it to third parties, the change in the water right should go through the approval process that any change or water transaction goes through. Accordingly, if a user wants to stop returning its treated wastewater to a river, he is free to do so. In doing so, he may be harming other users who have been relying on its return flow.

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359. *Id.* at 659, 666 (Describing how conjunctive management projects in California often involve multiple organizations. While the number of organizations involved is correlated with higher transaction costs, conjunctive management projects have taken off even on those scenarios).

360. *Id.* at 683. Nebraska has also implemented integrated management plans in the Platte basin. To understand the challenges it has faced, see generally Christina Hoffman & Sandra Zellmer, *Assessing Institutional Ability to Support Adaptive, Integrated Water Resources Management*, 91 NEB. L. REV. 805 (2013). For a historical assessment of the evolution towards adaptative, integrated management in the Platte basin, see Annah E. Birge et al., *Social-Ecological Resilience and Law in the Platte River Basin*, 51 IDAHO L. REV. 229 (2014).

361. Blomquist et al., *supra* note 357, at 674.

362. *Id.*

363. *Id.*

364. *Id.*

365. *See supra* notes 35 and 297-99; *see also* THOMPSON ET AL., *supra* note 78, at 174.

Many of our streams are overallocated.[366] Therefore, junior users have been allocated water which would not exist but for return flow[367] and changes in the water rights producing the return flow have effects on many users. If the user decides to reuse its return flows within the parameters of its original right, other right holders will not be able to object.[368] Both those junior right holders and the environment will be harmed because less water will be available.[369] There is no guarantee that the return flow reused by a city brings about more social benefit than the previous de facto allocation of that return flow to users junior to the city. In contrast, if the user decided to use its recycled water beyond the place of use defined in its water right or sell it to third parties, he would probably need to undergo an approval process though and the effects on other water users and the environment would be accounted for.[370]

Nonetheless, selling recycled water does not trigger the approval process everywhere. In Arizona, recycled water was considered a new product right-holders could sell in *Arizona Public Service Co. v. Long*.[371] The majority in *Arizona Public Service Co. v. Long* held, "the effluent in question is neither groundwater nor surface water. Whether diverted by appropriation or withdrawn from the ground, after use by the municipalities the water loses its original character as groundwater or surface water and becomes, instead, just what the statute describes—*effluent*."[372]. Or, as the dissent puts very eloquently:

> Without question, Arizona's surface water code governs those appropriations, and subjects them to the prior appropriation and beneficial use doctrines. Since the water when taken is subject

366. U.S. BUREAU OF RECLAMATION, COLORADO RIVER BASIN WATER SUPPLY AND DEMAND STUDY 3 (2012); Theodore E. Grantham & Joshua H. Viers, *100 Years of California's Water Rights System: Patterns, Trends, and Uncertainty*, ENVTL. RES. LETTERS 1, 3 (2014); Dave Owen, *Overallocation, Conflict, and Water Transfers* , ENVTL. RES. LETTERS 9 (2014).

367. *See supra* notes 42 and 297–99; *see also* Reed D Benson, *Public on Paper: the Failure of Law to Protect Public Water Uses in the Western United States*, INT'L. J. OF RURAL L. AND POL'Y. 1 (2011) (arguing that many streams in the West are fully allocated and given the protection of senior appropriators, water is more private than public in those streams).

368. *See supra* note 42 and 297-99 and corresponding text

369. *See generally*, *supra* note 36. For a study of the negative effects of increases in irrigation efficiency translating into an increase of water consumption and reduction of return flows in the Elephant Butte District in New Mexico, see Frank A. Ward & Manuel Pulido-Velazquez, *Water Conservation in Irrigation Can Increase Water Use*, 105 PNAS 18215 (2008).

370. A change in the place of use or the type of use of a water right—such as the ones a transfer of recycled water to third parties or the use of recycled water beyond the original place of use imply—triggers a review procedure. The parties will have to seek approval before a water agency, and the changes will only go forward if they do not injure third parties and, in some cases, the public interest. For an overview of the change in prior appropriation water rights, see ADLER ET AL. , *supra* note 22, at 153–61.

371. *See* Ariz. Pub. Serv. Co. v. Long, 773 P.2d 988 (1989).

372. *Id.* at 997.

> to beneficial use limitations, the real issue becomes whether, consistent with beneficial use limitations, the water components of the sewage effluent can be sold by the Cities. The majority fails to resolve this basic issue, but rather focuses on the end product, sewage effluent, and treats it without regard to the principles governing the use and disposition of the effluent's groundwater and surface water components. From this premise the majority then concludes that effluent is not subject to regulation under Arizona's groundwater and surface water codes.[373]

While it is a problem that prior appropriation allows a city to reuse the water in the same area of its original water rights even though the return flow may be more productive elsewhere, it is important that at least effluent is not treated as a different product so that at least the sale of effluent cannot escape the scrutiny.

However, a system that makes benefiting from recycling water too difficult may discourage investing in these technologies even though they may still provide a feasible source of water.[374] To make both protection of the current de facto allocation and incentives for recycling compatible, the Oregon water conservation statute may offer a model to follow. Conservation, thanks to efficient irrigation techniques, runs into similar problems as the recycling of the return flow. While drip irrigation is more efficient in an agricultural field than flood irrigation, the systemic effects are unclear.[375] Drip irrigation may allow for more dense production in a field, consuming more water than the lower production on the same field under flood irrigation did.[376] Under flood irrigation the unconsumed water went downstream to other users.[377] Oregon, acknowledging that, first tried to define conserved water based on the amount of water consumed.[378] Second, and more important for the purposes of properly regulating reused water, it allowed the farmer to keep 75% of the water conserved, while the other 25% is allocated to the state and permitted to continue its course downstream.[379] Twenty-five percent might be reduced if the farmer has received public funds to pay for the change in irrigation systems.[380]

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373. *Id.* at 999–1000.

374. For a general view on how water regulation have hindered investment in technology innovations in water compare to similar industries, see AJAMI ET AL., *supra* note 161,

375. *See generally* Casado Pérez, *supra* note 35.

376. *Id.* at 11046–47.

377. *Id.* at 11049–50.

378. OR. REV. STAT. § 537.455 (1987). Casado Pérez, *supra* note 35, at 11055.

379. Casado Pérez, *supra* note 35, at 11055–56.

380. *Id.* at 11056.

3. Further Regulations to Prevent Speculation

(a) Limits on How Many Rights One User Can Hold

This concern about concentration of rights in a few hands[381] is not exclusive of water and has translated into limits of how many rights someone can hold. This regulation capping the amount of rights any given right-holder can have has taken on a role traditionally set for antitrust law.[382] For example, in the surf clam and ocean quahog in the Eastern United States fishery, there were no caps on the amount of quotas an individual could get because it was believed that antitrust could deal with market concentration.[383]

There are limits in some fisheries on the number of quotas that someone can accumulate.[384] Similarly, during the homesteading period, there were set limits on the amount of land someone could claim.[385] There are also limits on the volume of oil leases that someone can hold on federal lands.[386] There could be both fairness and efficiency concerns at play. By distributing the wealth among more people, more people could have their livelihood ensured. It may also be efficient to ensure some base level for everyone if there were not economies of scale lost.

In fisheries, ITQs were first established not only to address the overexploitation of the fishery, but also a problem of overcapitalization.[387] The overexploitation of fisheries is unquestioned.[388] Limits on the overall capture of fish preceded the introduction of an ITQ system. This was the case in, for example, the Nova Scotia's small dragger or the surf clam and ocean quahog in Eastern United States fisheries.[389] They were not distributed between individuals though, so as a result, fishermen invested in large boats to be able to capture as many fish as

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381. *See supra* section IV.D.

382. *See supra* notes 258, 260, and 261.

383. MID-ATLANTIC FISHERIES MGMT. COUNCIL & NAT'L MARINE FISHERIES SERV., ATLANTIC SURF CLAM AND OCEAN QUAHOG EXCESSIVE SHARES AMENDMENT (2019), https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/5d2e132497c4d500016510e8/1563300650253/Excessive+Shares+EA+SCOQ+07-16-2019-Complete.pdf; B.J. McCay, *Initial Allocation of Individual Transferable Quotas in the US Surf Clam and Ocean Quahog, in* 44 CASE STUDIES ON THE ALLOCATION OF TRANSFERABLE QUOTA RIGHTS IN FISHERIES 86–90 (R. Shotton ed., 2001), http://www.fao.org/3/y2684e/y2684e09.htm#P0_0.

384. *See infra* notes 397–98.

385. *See infra* notes 406–12.

386. *See infra* notes 413–21.

387. McCay et al., *supra* note 234, at 89.

388. Mukhisa Kituyi, *90% of Fish Stocks Are Used Up—Fisheries Subsidies Must Stop*, UNITED NATIONS CONFERENCE ON TRADE & DEV. (July 13, 2018), https://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=1812.

389. McCay et al., *supra* note 234, at 88–89.

possible as fast as possible since they were competing.[390] When establishing ITQs, as the next step after setting the cap, there were two particularly controversial issues: the basis to establish the quota and the potential for consolidation.[391] For example, past catch volume could be the criterium chosen to allocate the fishing quotas. In the Nova Scotia fishery, which allocates rights to fish cod, among other species, the historical catch criterium was mitigated by including variables regarding the investment in vessels and by weighing more heavily recent years data.[392] The latter was meant to prevent newcomers from being at a disadvantage.[393] Including these criteria shows that efficiency was not the only goal in mind. [394] Under a pure efficiency framework, the distribution of quotas should not matter given their transferability. In fishing quotas, like in many other resources, distributive concerns are at play.[395]

The rate of consolidation was a concern in the Magnuson Act in the United States. Among its standards, it sets that "no particular individual, corporation, or other entity acquire[d] an excessive share of such privileges."[396] Furthermore, in 2006, the Magnuson-Stevenson Act was revised to hold that all ITQ programs must:

> [E]nsure that limited access privilege holders do not acquire an excessive share of the total limited access privileges in the program by—(i) establishing a maximum share, expressed as a percentage of the total limited access privileges, that a limited access privilege holder is permitted to hold, acquire, or use; and (ii) establishing any other limitations or measures necessary to prevent an inequitable concentration of limited access privileges.[397]

Consolidation is targeted by setting a 2% limit in the Nova Scotia dragger fishery: "no person or enterprise could hold more than 2% of the ITQ for a species in a specific management area."[398] Concentration may sometimes be inevitable because "[i]ndependent ownership is

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390. *Id.* at 89.

391. *Id.* at 90–91.

392. *Id.* at 96

393. *Id.*

394. *Id.* at 95–96 (explaining how the equity concerns where addressed in the Nova Scotia groundfish fishery).

395. *Id.*

396. Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1851(a)(4) (2012).

397. Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006, 16 U.S.C. § 1853a(c)(5)(D) (2012))

398. Bonnie J. McCay & Carolyn F. Creed, *Individual Transferable Quotas in Clams and Fish: A Comparative Analysis*, 82ND STATUTORY MEETING, INT'L COUNCIL FOR THE EXPL. OF THE SEAS 2–3 (1994), https://dlc.dlib.indiana.edu/dlc/bitstream/handle/10535/5673/Individual%20transferable%20quotas%20in%20clams%20and%20fish%20a%20comparative%20analysis.pdf?sequence=1&isAllowed=y; McCay et al., *supra* note 234, at 97.

often a fiction."[399] There are informal ways of vertical and horizontal consolidation. For example, in Canada, there may be agreements between processors and boat operators.[400] Despite the limits, the dragger fishery in Nova Scotia has experienced consolidation, dominance of a few firms, harder working conditions for the crew, in part due to the reduction in the number of vessels, and a geographic imbalance; that is, landings have concentrated in certain ports and away from others.[401] While the latter may be explained by the fish stocks,[402] the concentration in the industry is the result of the quotas, as the example of fisheries without limits on the number of quotas someone can hold shows.[403] Alaska's sablefish and halibut fisheries have tackled this problem of consolidation into large companies by creating different types of quotas for different types of vessels, and those shares can only be transferred within the class.[404] Small boat shares cannot be transferred to large ones.[405]

Homesteading is also a good example of limiting the size of individual allocations. Allocation of land, a natural resource, to those who moved West was limited to a certain number of acres.[406] The motivation, once again, seemed to combine efficiency and distributive concerns. The acreage per farm was limited, but it varied depending on the conditions of the lands being allocated.[407] The Homestead Act of 1862 offered 160 acres per farm,[408] but that proved to be too little for Nebraska. As a result, the Kinkaid Act of 1904 granted up to 640 acres.[409] Similarly, while the Timber Culture Act of 1873 offered 160 acres per farm,[410] grazing required more. The Stock-Raising Homestead Act of 1916 provided for grants of 640-acre tracts of grazing land.[411] Often these grants required some productive use of the land.[412]

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399. McCay et al., *supra* note 234, at 94.

400. *Id.*

401. *Id.* at 103–04.

402. *Id.* at 104.

403. *Id.* (comparing the Nova Scotia fishery with New Jersey ones).

404. BUCK, *supra* note 234, at 7.

405. *Id.*

406. *See* JAN LAITOS, NATURAL RESOURCES LAW 267–69 (3d ed. 2018).

407. BUCK, *supra* note 234, at 7.

408. Homestead Act of 1862, Pub. L. No. 37–75, 12 Stat. 392 (repealed 1976).

409. Kinkaid Act of 1904, Pub. L. No. 58-233, 33 Stat. 547 (repealed 1976). MONTY MCCORD, CALLING THE BRANDS: STOCK DETECTIVES IN THE WILD WEST 30 (2018).

410. Timber Culture Act of 1873, Pub. L. No. 42–277, 17 Stat. 605 (repealed 1891).

411. Stock-Raising Homestead Act of 1916, Pub. L. No. 64–290, 39 Stat. 862 (repealed in part 1976). For a discussion, see LAITOS *supra* note 403, at 319.

412. *Summary of the Homestead Act*, NAT'L PARK SERV. https://www.nps.gov/common/uploads/teachers/lessonplans/HomesteadActSummary.pdf (last visited Nov. 22, 2019); Anna Khomina, *The Homestead Act of 1862: Dreams and Realities*, U.S. HISTORY SCENE, http://ushistoryscene.com/article/1862-homestead-act/ (last visited Nov. 23, 2019).

The same is true for oil and gas leases on federal lands. The enactment of the 1920 Mineral Leasing Act shows Congress's intent to prevent concentration in the oil and gas sector by limiting the amount of rights to exploit energy minerals on federal lands individuals could hold.[413] Initially the limit was three oil or gas leases in any one state and not more than one lease within the geological structure.[414] However, the Act did not contain a limitation on the number of acres. Hence, someone who had three 160 acre-permits was maxed out, as was the person holding three 1,000 acre-permits.[415] This was corrected in 1926.[416] The first amendment to the Mineral Leasing Act included a shift on the limitation from the number of permits to the number of acres. It limited each individual right-holder to 7,560 acres in each state and 2,560 acres on a structure.[417] In practice, right-holders managed to work around these restrictions. Operators managed to control large expanses of land by taking operating agreements from the permittees, rather than assignments of the rights.[418] This practice was accepted by the Department of Interior until 1938, when it established that those operating agreements counted toward the maximum acreage of the operator.[419] In 1946, however, the Mineral Leasing Act was amended again. It expanded the acreage limitation per state to 15,360 acres and abolished the limitations within a single formation.[420] Today the Act reads as follows:

> (1) No person, association, or corporation . . . shall take, hold, own or control at one time . . . oil or gas leases . . . on land held under the provisions of this chapter exceeding in the aggregate two hundred forty-six thousand and eighty acres in any one State other than Alaska . . . . In the case of the State of Alaska, the limit shall be three hundred thousand acres in the northern leasing district and three hundred thousand acres in the southern leasing district.
>
> (2) No person, association, or corporation shall take, hold, own, or control at one time options to acquire interests in oil or gas leases under the provisions of this chapter which involve, in the aggregate, more than two hundred thousand acres of land in any one State other than Alaska, or, in the case of Alaska, more than two hundred thousand acres in each of its two leasing districts, as hereinbefore described. No option to acquire any interest in such an oil or gas

413. Ross L. Malone, Jr., *Oil and Gas Leases on Federal Lands*, 14 MONT. L. REV. 20, 28 (1953).

414. *Id.* at 25

415. *Id.*

416. *Id.* at 26.

417. *Id.*

418. *Id.*

419. *Id.* at 28.

420. *Id.* at 32.

> lease shall be enforcible if entered into for a period of more than three years . . . without the prior approval of the Sec-retary [sic].[421]

Translating these examples to water is not straight forward. One potential way to do so is to limit trades to only right-holders. This has the clear problem of discriminating potential new entrants on any market who needed water for their production. Those entrants would have to apply before an agency for a water right. The process is cumbersome, but so is the process of getting a transaction approved. However, a new application may be more difficult to obtain because streams are already overallocated. If a stream is already fully allocated and there is not surplus water to allocate, any new use, particularly a diversion, will have negative effects for other users or the environment. Those effects can easily be harsher than the effects of a transaction where the place of use or the type of use may change affecting other users and the environment, but the quantity consumed remains the same. While imperfect, a middle ground solution could be a thorough review of any water transaction by the agency that requires the company or individual acquiring the water right to actually use the water, perhaps even for a number of years, before being able to sell it. While this will not eliminate every single strategic behavior, it may discourage some. It may still be worth it to have to use the water right during a period before trading and speculating with it, but it will certainly be more expensive.

(b) Establishing Restrictions on Who Can Hold a Water Right

Most natural resources are conceived as public. As such, any individual right over them may be subject to limitations. Among those, there are limitations on who can own those limited rights. Beyond restrictions on foreign ownership,[422] it is often the case that regulations reflect the collective will of ensuring that those rights are productive and that windfall profits do not befall those who got a right to use a public resource.

In water, given that these new investors in water rights have managed to go around the forfeiture and the non-use prohibition, restricting who can hold a water right could be an avenue to mitigate the speculation problem. The example of grazing permits may provide a model. The Taylor Grazing Act defines who can hold a grazing permit and the Clinton Rangeland Reform implemented further such definition.[423] The move in the case of water rights would be the reverse than the one taken by Secretary Babbitt, who aimed at allowing environmental

421. 30 U.S.C. § 184(d) (2005) (emphasis added).

422. *See supra* text accompanying notes 161-72.

423. LAITOS, *supra* note 406, at 267-69.

groups to hold grazing rights so that they would let them rest and ranchlands would recover. The courts struck down the regulations, referring back to the original Taylor Grazing Act text that requires the right holder to be engaged in the livestock business.[424] Similarly, in some Canadian fisheries, there are requirements to be a licensed fisherman and a citizen.[425] The latter requirement is also found in the Mineral Leasing Act of 1920 still today.[426] This type of restriction could work well for certain types of water users, mainly, farmers, but it will be hard to implement as there is no licensing in place. However, the beneficial use requirement plays a similar role to the one played by "engaged in the livestock business." Like in the grazing rights or the fishing quotas, the legislation may be sidestepped by clever minds who irrigate the land and produce some low maintenance crops as an excuse or who graze two llamas instead of six cows because they consume less water. While coming up with a restrictive definition of beneficial use may be problematic, regulations could require a certain number of years of a particular type of use before the permit could be transferred to other uses. This will lock water in the agricultural sector but it will at least ensure a lower price given the lower demand for these type of rights for a while, further discouraging speculators.

Still, within this idea of limiting who can hold a right, it is worth exploring one of the limitations in the Alaska halibut and sablefish fisheries. In those fisheries, there are prohibitions to discourage absentee-owners such as requiring the quota-holders to be on-board.[427] Discouraging absentee-owners allows for the control of the rights to remain somewhat local.

VI. CONCLUSION

There are plenty of forces pushing water to be the new oil as it becomes scarcer due to climate change and increases in demand due to population growth. Even setting aside the physical differences such as the renewable nature of water, oil and water do not mix. The main difference is that while oil is essential, it is rarely irreplaceable. In contrast, water is imprinted by a sense that without it there is no life, and this belief informs the reluctance of many to let markets reign in water. But current investment in water as a commodity challenges

424. 43 U.S.C. § 315b (2012).

425. McCay et al., *supra* note 234, at 97.

426. Mineral Lands Leasing Act of 1920, Pub. L. No. 66-146, 41 Stat. 437 (codified as amended at 30 U.S.C. §§ 22, 48, 181–287 (1982)).

427. Pacific Halibut Fisheries; Groundfish of the Gulf of Alaska; Groundfish of the Bering Sea and Aleutian Islands; Limited Access Management of Fisheries off Alaska, 58 Fed. Reg. 59,375 (Nov. 9, 1993) (to be codified at 50 C.F.R. pts. 204, 672, 675, 676).

more than just our feelings about water. New investments escape the current regulatory framework for water rights aimed at ensuring efficiency and fairness in water management.

This Article does not claim that we should do away with water markets. In fact, given the myriad of forms that those markets in water take, it is unclear whether we could stop them. Markets can be positive tools for water management if they prompt us to be more conscientious in our water use. While in that sense, water is the new oil, a water market must be a regulated one. Investment should not reign unchecked. Water systems and uses are interdependent. As a result, externalities may abound. States should ensure that the investment does not come at the cost of non-internalized negative externalities to other water users or the environment. Furthermore, given that in water, fairness seems to be more important for the public,[428] this Article has also offered tools for those states that want to go further and correct the potential unfairness of water markets. The tools offered here have focused on water, but they could be extended to many other natural resources that climate change will make ripe for markets.

428. Dellapenna, *supra* note 37, at 364; Victor Brajer & Wade E. Martin, *Allocating a 'Scarce' Resource, Water in the West: More Market-Like Incentives Can Extend Supply, but Constraints Demand Equitable Policies*, 48 AM. J. ECON. & SOC'Y 259 (1989); GLEICK ET AL., *supra* note 108, at 36 (discussing the particularly deep feelings communities seem to have for their water).